THE

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OR,

SCHOOL OF ARTS:

CONTAINING

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SECRETS, EXPERIMENTS, AND MANUAL OPERATIONS

IN

ARTS AND MANUFACTURES,

HIGHLY USEFUL TO

GILDERS,
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PEWTERERS,
JOINERS,
JAPANNERS,
BOOK BINDERS,
PLASTERERS,
ARTISTS,

AND TO THE WORKERS IN METALS IN GENERAL,

AND IN

PLASTER OF PARIS, WOOD, IVORY, BONE, HORN, AND OTHER MATERIALS.

COMPILED ORIGINALLY BY

G. SMITH.

Sixth Edition,

WITH A GREAT NUMBER OF ADDITIONAL RECEIPTS, CORRECTIONS, AND AMENDMENTS;
A COMPLETE TREATISE ON FIRE WORKS, AND THE ART OF SHORT HAND WRITING.
ILLUSTRATED WITH ENGRAVINGS.

VOL. II.

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OWING to the encouragement given to the sale of this Publication, the number of Plates in this Second Volume will be found to exceed those in former editions. Besides a revision of all the pages, which, it is trusted, has been productive of improvement, a variety of new and useful matter has been introduced, and such parts have been expunged altogether, as time had rendered obsolete, or useless. A treatise on *Angling*, and another on domestic *Singing-Birds*, which have been added will be found highly useful to country purchasers, in lieu of the old-fashioned and too circumscribed chapter on *Building*, which was also faulty in many respects: and a great number of detached receipts have been collected together in the last Part, many of which are scarce, and extremely valuable.

As many of the plates are referred to in a variety of places, it has been impossible to assign a fixed page for every plate; which has imposed the necessity of giving the following general instructions (capable of being altered hereafter at the will of any individual)—

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Please to place the Plates at the end of their respective Volumes; which are readily ascertained by the Plates of the Second Volume being particularly marked VOL. II.

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THE

LABORATORY:

OR,

SCHOOL OF ARTS.

PART I.

ANCIENT COINS AND MEDALS.

IT is a rule in common life to put the greatest value on such things as are most profitable, and from whose use we may expect to reap the greatest riches; hence, coins and medals have, by men of business, been thought an idle and unprofitable amusement, fit only for such as are subject to melancholy; or have no other more material employment to pass away their time. But the sentiments of these gentlemen are not to be a general precept for our imitation; since we shall find that, after ordinary labour and fatigue in business, we may be eased and refreshed by recreations that are more suitable and entertaining to our mind, and, at the same time, reap a considerable benefit, when by instruction we obtain improvement and increase of useful knowledge.

The study of coins and medals is held in high esteem, as it affords us the pleasure of representing to our ideas the state of affairs in times past, and leads us into the history of former ages, [illegible] more exactness and truth than the writings of ancient authors; which are not always to be depended upon, but are frequently liable to be suspected, and require to be put to the test of better authority, by inspecting monuments, and other remains of antiquity.

Among all the remains of antiquity that have escaped the injuries of time, ancient coins and medals may justly merit the pre-eminence; and although it must be allowed that antique statues, monuments, inscriptions, and edifices deserve great veneration, since by them we can trace the history of illustrious heroes, and behold the magnificence, beauty, and order of architecture in temples, gates, and palaces, which to this day are patterns and rules for our imitation; yet, time has stript most of them of their former beauty and glory, and still continues so to do, whilst we find that ancient coin has escaped her fury, and will remain probably, in perfection, till time shall be no more: thus, what in the former is defaced and rendered obscure and unintelligible, is by the latter cleared up and explained. By coins and medals we discover the mysteries of the ancients' manner of worship, the instruments made use of in their sacrifices. the Gods they adored, and the government of the times. We take a view of various magnificent temples, circuits, amphitheatres, pyramids, palaces, bridges, harbours, sepulchres. triumphal arches, columns, obelisks, gates, and other remarkable public edifices, with their inscriptions, and beautiful characters and letters. They shew us the portraitures of illustrious heroes, princes, kings, and emperors, together with their habits in time of peace or war; the garlands, crowns, and other ensigns of honour bestowed on victorious commanders; their births, marriages, victories, and high honours; and, in short, every thing remarkable and worthy of the information of posterity.

But, to keep within the bounds of our design, we shall give the curious a few instructions, whereby they may be led to know and distinguish the real antique from the false and adulterated coins or medals, and present them with the following rules for the use of them.

Coins are esteemed, not according to their metal or intrinsic value, but by the image, inscription, and figure of them, and by the plenty, or scarcity of them. Hence it frequently happens that a coin of brass or copper is preferable to one of the same weight in gold. Some coins are rare only on account of their regular succession; and some again are rare, although their suite be intermixt, of various sorts: as for example; the medal of *Antony*, in copper, of the larger sort, is very scarce, but the lesser sort supplies the want of them; on the contrary, those of Agrippina are only to be had of the larger kind. The *Otho*'s are very scarce in copper, but common in silver. *Augustus*'s are easy to be had of all sorts and sizes. In gold, the *Orbiana*, *Paulina*, *Tranquillina*, and *Cornelia* are very rare, but in great plenty in copper. The *Coloniæ* of the middling size are very common, but the larger sort extremely scarce. Coins or medals, which are found but in one or two cabinets of sovereign princes, are inestimable. Of this sort is the medal of *Otho*, in copper, of the larger size; of which, it is said, there is but one in being.

We must learn to distinguish medals from current coins: this we may easily do, by comparing the sculpture and size of the one and the other; for a medal surpasses both in size and sculpture the current coin, and for that reason, if they have been preserved and kept from injury, they are the more esteemed. The antient Roman medals may be known by their deep impression, or extraordinary thickness, from the current coin. The silver medals which were coined in Italy, seldom exceed the weight of four drachms. These sorts of medals were distributed in memory of cities, kings, and commanders. The medals of the colonies are found to be but small, and the larger sort, in copper, very scarce.

All colonial coins are, in comparison to other current coins, rare and valuable, the more when they illustrate the history of the times, or shew towns and cities which would have been unknown without them, and represent the magistrate who caused them to be coined. Again, when, on the reverse, one or two oxen are represented, together with a priest guiding the plough, or has ensigns of war, it shews they are counted to be a common coin. From these signs we may however learn by whom the colony was established: in case the plough stands by itself, it denotes that only a common, poor sort of people were sent thither: if the coin bears the ensigns of war only, it shews that the veterans made their settlement in that country. If both the plough and ensigns are upon it, it signifies that both citizens and soldiers removed thither. By the different sorts we may likewise learn whether cavalry or infantry were sent to these respective colonies.

The name of each colony is derived from their founder; all those which were established by Julius Cæsar, are called *Juliæ*; those of Augustus, *Augustæ*, &c.

Although several colonies were by the Romans established in Italy, yet we find no coin extant of any of them, whence it is apparent that this honour was only bestowed on such cities as had a privilege for coining, which was not granted to any of the cities in Italy, besides Rome.

In some Grecian coins we find the union or alliance of cities expressed by the word ΟΜΟΝΟΙΑ; as between Sardis and Ephesus, and likewise between Smyrna and Pergamus, &c.

Some of the Roman coins distinguish the Roman from the Latin colonies. Those cities which had the image of Romulus and Remus, with the wolf, on their coin, had the city law granted them; but such as had only the Latin law, were without that impression.

After Caligula's government, no coins of Spanish colonies are found, notwithstanding they are in abundance in the reigns of Augustus and Tiberius.

We shall now give an account of some particular and scarce sorts of coins. 1. All such coins which in their exterior form have something extraordinary, as for example, the Padua square pieces of coin, &c. are false. 2. The goodness and quality of metals are no sufficient proofs that the coin is not false or adulterated: hence we may conclude that all the Gordiani of gold, likewise the Pescennii and Maximi, are not much esteemed, since it is evident there is none genuine of that metal, but perhaps counterfeited by Carteron. We may reject the Plotinus's of copper, of the middling sort; likewise the Marcianus's, because none are found of that size. 3. It frequently happens that in one country a particular sort of coin is scarce which in another is plentiful. The *Posthumi* are very scarce in Italy, but plentiful in France. Thus it is with the *Ælii*, in copper, of the larger sort. This is a hint to those who may have an opportunity to make advantage in changing coins. 4. Julius Cæsar was the first that was allowed to have his image struck on coins, which, in copper, of the larger size, are not to be found; but such as have Augustus's image adjoined to his, are, we may be sure, coined after his death, and therefore all of the above size must be false.

Coins are divided into old and new; the first class is most esteemed, and placed among such as were struck before the end of the third century; those coined after that time are counted among the modern ones.

Metals have, at all times, and among all nations, served for making of coins: the principal ones are gold, silver, and copper. There are some nations in the Indies whose coin indeed is made of tin or pewter.

Gold has, of all other metals, the pre-eminence. The most antient coins, in this metal, were struck in Greece, in the reign of Philip King of Macedon, and that of his son Alexander the great. In Rome, gold coins were first struck, five hundred and forty-six years after the building of that city, or sixty-two years after they had introduced the silver coin For the silver coin, according to Pliny, had its first circulation anno 484, after the foundation of Rome, when Q. Ogulnius and C. Fabius were consuls.

The gold coins are the more considerable, as their intrinsic value by far exceeds those of silver, and are on that account chiefly in the possession of persons of great rank and fortune. The silver coins may be more easily collected, because their intrinsic value is less, and the number of them far greater; besides, as they throw a great light on ancient history, they answer the purpose in that respect as well as the gold ones. The Greeks and Romans, Hebrews, Goths, Spaniards, and all the present sovereigns, have made the most use of this metal. We shall present the curious with a copy of an ancient Grecian silver coin, which represents Homer's head on one side, and the memory of his birth on the other, near the river Melos. *See plate* I. *fig*. 1.

The Roman coins are divided in two classes, viz. those under their consulship; and those of their emperors. Except on account of antiquity, the latter are preferable, by informing us of the names of many illustrious persons, which otherwise would have been lost in oblivion, and in giving us a particular account of their actions.

The Hebrews, who from the Egyptians had learned many useful arts, might be looked upon to have had the most ancient coins in their possession; yet the contrary is evident from their scarcity among them. We however shall here present the curious with a copy of one of the pieces of silver, (a Jewish Denarius) for thirty of which Jesus was sold by Judas, Matt. xxi. 3. On the reverse is a cup or chalice: it is thought that the only real one is in the library of the Escurial, deposited there by Charles V. king of Spain. *See the representation in plate* I. *fig*. 2.

The Punic or Carthaginian coins are said to be first introduced by queen Dido, but none of them are now to be had. We shall here give one specimen of that sort of coin, which, for its remarkable impression, is worthy the notice of the curious. *See plate* I. *fig*. 3.

The Spaniards imitated the Carthaginians in their coins, as being under their subjection: but it is to be lamented that the characters then in use are now defaced, and illegible: whereby many things are hid from our knowledge.

Under the Gothic class of coins are comprehended all such as are of an aukward form and stamp, without any art or curiosity. They commenced currency after the desolation of the Roman empire. What can be gathered from their obscure inscriptions, are only the names of their kings or tyrants, as Atalarius, Wittigis, Torilæ, Attila, &c. their silver coin consisted more of copper and iron, than of silver; and in their gold ones, hardly the fourth part was of that metal; the rest was a mixture of silver and copper.

We come now to the copper coin; which afford us the greatest light into history. The avarice of men has at all times been such as to pay no regard, but melt the most curious gold and silver coins, to answer their insatiable passion for gain; while copper coins, on account of their small value, escaped their destructive hands. With respect to antiquity, the copper coins bear the pre-eminence; since they were in vogue long before those of gold and silver. They are held in great esteem among the antiquarians, because they find the same illustration on them as they do on the former. All the time that the Greeks were under the Roman government, they struck a vast quantity of copper coin, with curious and ingenious devices; but very few in silver, and fewer in gold: the establishments of colonies were chiefly coined on copper: medals, except some few, are of copper, as the Greeks and Romans made use of gold and silver for other purposes. We shall shew the curious two sorts of the smaller size of these coin; the first is that of Agrippina, the mother of Nero, with Diana on the reverse: the second, which is something larger, represents Zenobia, widow of Odenatus, and queen of Palmyra. *See plate* I. *fig.* 4, 5.

The middle size of copper coins are, before all others, in great esteem, because they illustrate the atchievements of heroes, their conquests and victories; they also inform us of the origin of worship among the ancients. Every province had some particular aim in perpetuating the memory of their lawgivers, and men of renown. The Amasians represented on them Homer*, because they supposed he was born in their province. The Ephesians held their temple dedicated to Diana for their greatest honour; on which account they exhibited its grandeur on all their coins. The city Ascalon, in Palestine, always represented queen Simaranis the foundress; and many other cities followed their example.

The Phœnicians were the first that made themselves considerable in the marine. The Grecians learnt it of them, and other nations followed their example. By these they established the colonies in Europe; on which account we find many marks of honour, and the memory of such popular advantages, preserved on these coins. And thus by inspecting into the figures and inscriptions of the several ancient coins, we may unfold the mysteries and reasons they, at first, were intended for: some, indeed, represent poetical fictions only in a most beautiful and charming manner; but others have their stamp from historical truth. There is a curious medal, in copper, of the middle

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[*] Homer is claimed by *ſeven* great cities, which has given rise to the following distich, in Latin:

"Smyrna, Rhodos, Colophon, Salamis, Chios, Argos, Athenæ;
"Orbis de patriâ certat, Homere, tuâ.

It was Strabo, not Homer, who was born in Amasia. *Ed.*

size, which represents Julia, sister to *Julia Domina*, consort to the emperor Severus: the reverse is admirable, for it has the twelve signs of the Zodiac, in the same figures that are made use of by astronomers to this day. The Amasians, an Asiatic people, honoured her with this coin or medal, perhaps, to signify that her wisdom merited the empire of the earth, and her virtue the glory of the heavens. *See plate* II. *fig.* 1: Or it may allude to the name of the *Princess*, which in the Syria-Phænician language signifies the sun: for as that planet distributes its light to the rest of the luminaries, she, in like manner, in her time, was the brightest ornament of the imperial court.

Concerning the coins of the largest size, the artists of antient Greece, as well as Rome, have had more scope to exert their skill: the senate of Rome authorized the coining of them, by adding the mark of S. C. upon them, not only to determine the weight, but likewise the figures and devices of them. As these coins exhibited the real likeness of the emperors, and the reverse of them was finished with some historical piece or other, to the greatest nicety and perfection, they are the more esteemed and valued.

Medals are, by most Antiquaries, judged to be struck for the amusement and satisfaction of great and illustrious persons; as to this day it is customary among the sovereign princes, on particular occasions, to cause medals to be struck on inaugurations, coronations, marriages, births, &c. and to be distributed to persons of rank and fashion. The Greeks and Romans were very ambitious by such means to perpetuate their memory; and this they thought would be accomplished, when, with the greatest ingenuity and art, they were struck or stampt in copper; for, although those medals should fall into the hands of their enemies, they, considering their low value, and admiring rather the great curiosity and art bestowed on them, would on that account keep and preserve them; while they might melt those struck in gold and silver. We shall here give a copy of an extraordinary curious medal, which on the one side represents the emperor Commodus, and on the reverse, one of the completest sacrifices that is left among the remains of antiquity. *See plate* I. *fig.* 6.

Of new, or modern Coins.

THESE are held in great esteem among such virtuosos as entertain more value and veneration for the modern than antient coins, because they come within the order of the christian æra, or even their own memory. These coins will afford the curious collector a series or succession of popes, emperors, kings, princes, republics and cities, nay, even of some celebrated persons in public or private life; and there is hardly any thing remarkable, but what we find commemorated for the information of succeeding ages. These sort of coins are not only beautiful, but plain and easy to be understood by such as have the least knowledge of history: they represent to us the images of persons, the engagements that have happened both by sea and land, the sieges of towns, triumphal entries, solemn funeral processions, alliances, marriages, and every thing else that concerns, or may relate to, ecclesiastical and civil occurrences. In all modern coins we find the date of the year, nor can we be so easily imposed upon with respect to counterfeits, for we may plainly distinguish the *stampt* from the *cast ones*.

The succession or series of popes we may have both in silver and copper, from Martin V. who lived in 1330, to the present time. Such as have been coined before that time are suspected, and looked upon as uncertain; whether coined in the reign of them, or by their successors. Sixtus IV. was the first who had his image stampt on his coin, with this inscription, UTILITATI PUBLICÆ; and from this begins the regular order of the succession of popes handed to us in coin. The golden coin of pope

Eugenius V. that was struck in the time of the council of Florence, was only to be met with in the late king of France's cabinet of coins. Here we must observe that these are real coins, but of *cast* ones we have a complete succession from St. Peter to the present time.

We might, indeed, make a successive collection of the coins of the western emperors, in case we were to complete it with divers sorts of little or no value: and the regular succession of the house of Austria is not to be easily met with, but from 1463, when Ferdinand III. caused his triumphal entry into the city of Rouen to be stampt on coin. The order of the Spanish succession on coins is traced from Philip I. father to Charles V.

The new, or modern, medals, commence from the time the Goths were driven out of Italy; and about three centuries ago, the Popes began to cause their histories to be struck on medals, which custom has been followed by most of the European princes.

I shall conclude this subject with taking some notice concerning

Modern Medals.

The derivation of the word *medal* has no need of any farther explanation than that it implies a piece of metal, whereon are struck images, symbols, figures, inscriptions and mottos, with the greatest ingenuity, perfection and beauty, art is able to produce, to perpetuate the memory and exploits of princes and illustrious persons, and for conveying down to posterity such occurrences and transactions as are most remarkable, and worthy the information of future ages. Hence we shall do well to distinguish medals from the circulating, or current, coin; as the one is struck upon some particular or extraordinary occasion, and the other for convenience in the general transactions of trade and business.

The modern medals derive their origin, order, and succession, as has already been said, from the time the Goths were driven out of Italy. Before their incursion into that country, arts and sciences flourished to the highest degree, and medals were struck at Rome with exquisite beauty and perfection: but when the Goths, Vandals, Huns and Lombards had subdued Italy, and had the possession and government, all arts and sciences were at a stand, and the most ingenious artists changed their implements for those of war. However, no sooner were those barbarous nations expelled that country, but the liberal arts and sciences began to revive.

Most antiquaries agree, that, of the modern medals, those that were struck in the reign of Charles the Great are the most ancient. Next to those, the medals of the emperor Louis are in high esteem, as are those of Otto I. who was the founder of the city of Magdeburg in Germany.

Among the medals struck in the XIVth century, that of John Huss is very rare and valuable. In the XVth century we find medals increase; but those that were struck in the reign of Charles V. are held preferable to any of the rest. In the XVIth, and the present century, medals continued their increase, and have at this time arrived to the highest perfection.

The most complete cabinet of modern medals in Germany, is judged to be that of the king of Prussia; as they give a succinct account, or history, of that illustrious house, and its noble exploits and heroic actions, both in time of peace and war, in a regular succession, for several generations.

In Italy we find the history of the Popes, in their successions, regularly exhibited on medals, for three centuries past. They are published curiously engraven on copper, together with the historical explanation of them.

I could have wished to have given the curious a more perfect account of the several cabinets of ancient and modern medals in England; no doubt but they would equal any other in Europe. At present I shall content myself with stating, that those medals struck in king Charles II's reign are in high esteem among the connoisseurs, on account of their elegant sculpture. The medal also struck at the reformation, in king Henry VIII's reign, is very valuable and scarce; as are those struck in the time of Oliver Cromwell's usurpation. The coronation medals of king George I. as likewise those struck for the inauguration of his present majesty, and the late queen Caroline, are of an exquisite, beautiful impression.

France, indeed, boasts the pre-eminence of all the cabinets in Europe. The history of the medals it contains is printed, together with copies of them very curiously engraven on copper-plates.

In Holland, modern medals are very plentiful. They are struck, without controul, not only in commemoration of public state-affairs, but likewise on private occasions, as on births, nuptials and burials, in families of rank and fashion. As the Dutch are very satyrical in their devices, they have given frequent offence in the symbols exhibited on some medals, to several sovereign princes; especially in time of war. With respect to the matter of the medals, we must observe, that, for the generality, they are made of pure gold or silver, without the allay of any other metal. Some indeed are struck on superfine copper.

The size of medals is divided in the small, middling, and large. Of the smaller sort are found but few, and are valued much, because of the curious and artful sculpture bestowed on them. The middle sort are about the size of a crown-piece, and the most in vogue. The large sort, which are called medallions, are but seldom struck, except intended for particular presents. The medal struck in gold, in king Henry VIII's reign, 1534, on account of the reformation in the church, weighs seventeen and a half ducats.

The *utility* of these medals is next to be considered; and as it has already been observed, that the ancient coin and medals throw great light on ancient history, so it may be said with respect to modern medals, that by the bare inspection of them we reap the same benefit; we not only view the portraits of illustrious persons both civil and ecclesiastical, but likewise, on the reverse, are informed upon what occasion those medals were struck.

Some medals shew the grand revolutions that have happened both in church and state. They also inform us of grand councils, synods, and extraordinary conventions, on several occasions. A gold medal was struck in memory of the council of Florence, by pope Eugine IV. In the XIVth century is the remarkable medal of John Huss. In the XVth century, about one hundred years after John Huss, began the reformation by Luther, in Germany, on which account many medals were struck; with the images of not only that grand reformer, Luther, but likewise those of Melanchthon, Erasmus, Calvin, Zwinglius, and others. To this sort of medals belong such as were struck in Holland, in memory of the Spanish inquisition.

The medals that were struck on account of heretics, are many in number; in Germany are those of Thomas Munster, Knipper Dolling, John van Lyden, and many others. Dr. Becker in Amsterdam, who was the author of a celebrated treatise, called *The inchanted World*, had his memory perpetuated on a fine medal, which was caused to be struck by his friends, with the date of 29 Jul. 1692.

A great number of medals have been struck on account of moral virtues, exhibiting the mottos of several princes, and other illustrious persons. On a medal of Frederick III. elector of Saxony, in Luther's time, is this motto: VERBUM DOMINI MANET IN ÆTERNUM. On the medals of the emperor Leopold I. are these words: LABORE ET INDUSTRIA:—thus we find the mottos of several other princes on their medals. The symbol of piety was by Gustavus Adolphus, king of Sweden, represented on a medal, by a woman with her hands folded, resting with one of her feet on an anchor, alluding to *hope in God*.

Of what use and benefit medals are in the study of political history, chronology, heraldry, poetry, literature, physic, chemistry, astronomy, geography, architecture, painting, and sculpture, &c. would be a task too large to be inserted, from what has already been said, the curious may be invited to have recourse to such authors as have written at large upon these subjects.

We shall now give *A short explanation of such figures and emblems, &c. as are found both on ancient and modern coins and medals*; and divide this subject under two different heads: we first inspect the side of the coin whereon is represented the image, or head; and secondly, the reverse, with the figures or symbols.

Explanation of the Figures on the Image, or Head-side of the Coin.

THE heads which appear on coins are either covered, after various fashions, or uncovered.

When we find, on imperial coins, heads uncovered, it denotes that the prince represented is either a real or adopted son; such is Nero the younger; Ædius the adopted son of Adrian; and Aurelius, that of Antonius. Sometimes it signifies a prince that never came to the imperial dignity, as Drusus, Germanicus, Antonius, &c. However, it is to be observed, that this rule is not always without exception, since in both instances the contrary may be produced.

The covering of heads occurs in various fashions, the most ancient is the royal diadem, the use whereof was long before crowns, and only the property of kings; they were in the latter end of the Roman empire made use of by the emperors. This diadem was a fillet round the head, which is sometimes presented larger than at others: it was tied behind, and both ends of the ribbon hung down the neck over the shoulders. After Constantine the Great, the emperors wore them garnished with one or two rows of pearls and precious stones: it was likewise allowed to be worn by the emperors consorts.

The imperial crown, from the reign of Julius Cæsar, has, for the generality, been a wreath of laurels, which was presented to that emperor, to be worn upon his head, by the senate of Rome.

Justinian was the first emperor that introduced crowns; these were sometimes arched low, and sometime higher, and broader; on the top was always fixed a cross. The crown itself was richly ornamented with the choicest pearls.

The radiant crown, on ancient coin, signifies that the prince was, either in his life time, or after his death, Deified.

We find other sorts of crowns called *rostratæ*, or naval-crowns. They were shaped in imitation of beaks of a ship: these were presented to such as had gained a victory at sea. Agrippa received one of that kind, after he had gained a complete victory over M. Antony's fleet at sea.

Some are called *coronæ murales*, or mural crowns: these had the resemblance of walls or towers. They were bestowed even on common soldiers, and such as had stormed, and were the first that entered, a fortified town: these sort of crowns were likewise placed on the images of those Gods that were patrons of cities, and towns dedicated to their protection. Thus Cybele, and the other genii of provinces and nations, had these sort of crowns for their distinction.

The *coronæ quercinæ* (made of oak branches) were given to such as were conquerors at public shews.

The priests' head-ornament consisted of the shape of an ox's head, about which were ranged the vessels made use of to hold the entrails, and likewise the ropes by which they conducted the sacrifice to the altar. Of this sort one is found on a coin of Augustus.

The *helmets* of the Greeks and Romans are easily distinguished. This sort of covering is one of the most ancient, and appears on coins and medals not only on the heads of emperors and kings, but even on those of the gods themselves. Those on a Roman head, have commonly two wings, like those of Mercury. On royal helmets are frequently found horns, either those of Jupiter Ammon, or those of an ox, or of rams, to denote their particular courage and magnanimity.

To foreign head-ornaments we may add the Armenian and Syriac Mitra, which resemble a bishop's mitre, only sometimes they are of a square form, and sometimes indented a-top.

The *tiara*, resembling a papal crown, was peculiar to the kings of Persia. The Phrygian and Armenian mitre was only worn by kings. Many of the Grecian kings covered their heads with the lion's skin of Hercules, which is observed on Philip, the father of Alexander. They have been imitated by some Roman emperors, as Commodus, Severus, and others.

A *vail*, wherewith princes or emperors heads are sometimes covered, denotes either their priestly office, or their being deified, with which dignity all the emperors to Constantine the Great were honoured. However, in the latter end of the empire, we find that the heads of the emperors were surrounded with radiant beams, as is plainly seen on the coins of Maurice, and others: this is likewise found about the heads of some of the first emperors. The later Constantinopolitan emperors, up to Justinian, out of uncommon zeal and devotion, place the image of Christ, the virgin Mary, or some saint, on the reverse, with a radiant circle round their head. The heads of the gods are in like manner covered with crowns, helms, vails, bonnets, or other marks of distinction.

A crown, or wreath of laurel, denotes Apollo, and the genii of the Roman senate.

A wreath, with ears of corn, signifies the goddess Ceres. And one of flowers denotes the goddess Flora.

A wreath of vine-leaves denotes Bacchus and the Bacchanals.

A radiant crown is a sign of the Sun, when they proceed from the head, and are not separated from it by a circle.

The helm is ascribed to Mars and Minerva, and if an owl is placed thereon, it is a sure sign of the latter.

A cap, resembling a night cap, denotes Vulcan and the Cyclops; but if there is found a star, it is designed for Castor and Pollux.

A certain measure, seen on the head of Serapis and the Genii, shews their providence, and the measure they distribute both to men and beasts, for their sustenance.

Juno is frequently covered with a veil.

Apis is figured in the shape of an ox, between whose horns is a flower; the forehead is marked with a white star, and over the head is the moon, in its increase. Osiris is distinguished in the same manner.

Isis and Canopus carry a flower before them, resembling a lily; as does the goddess Spes, or Hope.

The Pantheon represents several deities in one, of this we have an example from the coin of Antonius Pius which figure denotes, by the indented crown, the Sun; by the horns, Jupiter Ammon; by the long beard, Pluto; by the trident, Neptune; and by the twisted serpent, Æsculapius. These sort of figures are frequently met with on ancient coins.

If the image of a prince be represented with both hands, carrying, in one, a globe, it shews him to be a sovereign. On this globe is sometime seen a winged victory, which denotes that his sovereignty derived, and was obtained, by his victorious arms. On others is found a cross, denoting the empire to be dedicated to Christ. These last are only found to be coined after Constantine.

On an imperial sceptre, especially that of the Constantinopolitan, we find an apple with an eagle, to signify that their government was arbitrary, and without controul.

The god of the moon carries a half moon on his shoulders, by which he is known; for that planet was thought to be of the male kind, and that he punished such as adored the same in the shape of a goddess, with unhappy marriages.

A smith's hammer and anvil denotes Vulcan. The Anubis is known by the head of a dog. A lion's skin represents Hercules.

An Explanation of the Figures on the Reverse of some Ancient Coins.

A FIGURE holding in one hand a thunder-bolt, and an eagle under his feet, denotes Jupiter: but crowned with laurel, holding a lyre in his hand, represents Apollo.

Most deities, genii, and heroes, are distinguished by the horn of plenty, to denote that our riches, happiness, and satisfaction, are owing to their providence, diligence, and protection.

The Caduceus, or winged staff, twisted about with two serpents, is a particular mark of Mercury; yet it is borne by other gods, to denote good government, peace, and happiness.

The Thyrsus, or a staff twisted about with ivy, or a vine, is a mark of Bacchus, or his followers, who through excessive drinking of wine grow delirious.

A branch of laurel in the hand of an emperor, denotes his conquests and triumphs. If an olive branch, peace.

Ensigns of war on an altar, signify a new established colony of ancient and disbanded soldiers.

A rudder on a globe, followed by the fascii, or staff-bearers, denotes sovereign authority.

A ship in full sail shews the enjoyment of success in worldly affairs.

A bunch of grapes intimates plenty, joy, and a good vintage.

A bent tapered cap, with two hanging down fillets, together with the utensils for sacrifices, are marks of priesthood. The head of the beast denotes the sacrifice itself; with the axe wherewith it is killed, the dish to hold the entrails, and the knives to divide it. The vasculum was a vessel wherein they kept the holy water; the sprinkler, wherewith they sprinkled the spectators; and the vessel, by which they poured the wine on the head of the sacrifice.

A waggon denotes the magistrate, either the ædiles-prætor, or consuls; each had the privilege to be carried in a waggon of ivory. A waggon drawn by horses, lions, or elephants, shews either a triumph, or deifying, of a prince; but if drawn by mules, it relates to the deifying of illustrious ladies.

A wheel on a coin signifies that in the reign of such a prince the public roads have been improved. If at the feet of Fortune, it shews the instableness of that goddess.

All the gods and goddesses have their particular marks or symbols: Jove is known by his thunder-bolt and eagle; Neptune by his trident and dolphin, Juno by her peacock; Æsculapius by the serpent; the Egyptian god Canopus is represented by an earthen vessel, with a head rising out of its mouth; Cybele has a crown of towers on her head, and a lion lying at her feet; Ceres is crowned with a garland of corn-ears; and Flora with one of flowers; Diana is known by the half moon on her head; Venus by an apple in her hand, or accompanied by Cupid, or a rudder; sometimes she has a shield and helm, to denote the force of love; Peace is represented by an olive-branch, or a torch, by which the ensigns of war are set on fire; Providence is figured with a staff in her hand, touching a globe, to signify her governing the world; Piety is commonly expressed by being veiled, or having her hands lifted up towards heaven, or with a censer of frankincense, at her feet a crane; which bird is an emblem of filial duty, because they are said to take care of their parents when old; Liberty carries in one hand a hat, and in the other a rod; Vesta carries a burning torch in her hand; Liberality carries a square table, marked with certain points; three naked female figures represent the Graces; the three Furies are figured with daggers, torches, and other weapons in their hands, and their heads are covered with snakes instead of hair. Figures sitting, and pouring water out of a vessel, signify the rivers.

Provinces and countries were always distinguished by certain marks: thus, Africa is figured by an elephant's head, scorpion, lion, or tyger, those animals having their origin from that quarter. Asia was distinguished by a serpent, or rudder, because the Romans could not go to that part of the world but by shipping. Europe had no other distinguishing mark but what is on a coin, struck at Sidon, which represents Jupiter's carrying off Europa. Macedon appears like a driver with a whip in his hand, which denotes the plenty of the finest horses in that province. Mauritania was likewise figured with a running horse, because that country produced the best race-horses.—Egypt is known by the sistrum, a musical instrument; as also by the stork, or the crocodile. Italy is represented by a woman seated on a terrestrial globe, with a sceptre and cornucopia in her hand, and a crown on her head. Gallia appears in the habit of a soldier, with a sort of spear in his hand. Arabia is denoted by a camel, as likewise the balsam and frankincense-tree. Sicily represents itself in a figure with three legs, on account of its three capes. Germany appears like a large woman, armed with shield and spear. Great-Britain as leaning on a ruddel, with the head of a ship at her feet. Corinth has for its mark a winged Pegasus. The city of Ephesus is denoted by a stag, which animal is dedicated to Diana.

A phœnix represents eternity; sometimes it signifies the hope of better times. A peacock and eagle shews a prince deified. A capricorn, whether by himself, or with another, is always the sign of the nativity of Augustus. A *crowned dolphin, with Neptune's trident, is an emblem* of commerce, and sovereignty over the sea. A dog with a muscle signifies the city of Tyre. Oxen are marks of patience and strength; they also signify peace. A cock is an image of the deity of the moon, and sometimes of Mercury. By an elephant is denoted eternity, on account of the long life of that animal; but commonly a sign of public shews: and it likewise denotes Africa.

This is the short explanation of some of the figures we find on ancient coins. Such of the curious who make themselves acquainted with them, will reap no small benefit in the study, till by diligent reading, and frequent examining of antique, as well as modern coins and medals, they may grow more perfect. We shall only add

A short Explanation of some Abbreviations, which frequently occur on the Roman *Coins.*

A.

A.	*Aulus.*
ACT.	*Actiacus.*
ADIAB.	*Adiabenicus.*
AED. CUR.	*Ædilis Curulis.*
AED. PL.	*Ædilis Plebis.*
AEL.	*Ælius.*
ALBIN.	*Albinus.*
AET.	*Æternitas.*
AFR.	*Africa*, s. *Africanus.*
ANT.	*Antonius*, s. *Antoninus.*

ARAB. *Arabicus.*
ARAB. ADQ. *Arabia Adquisita.*
AUG. *Augustus*, s. *Augur.*
AUGG. *two Augusti.*
AUGGG. *three Augusti.*
AUR. *Aurelius.*

B.

BRIT. *Britannicus.*

C.

C. *Caius.*
CÆ. A. *Cæsar Augustus.*
C. or CÆS. *Cæsar.*
CENS. P. *Censor perpetuus.*
C. L. V. *Colonia Julia Victrix*, or *Valentia.*
CN. *Cneus.*
COL. *Colonia.*
COL. NEM. *Colonia Nemausensis.*
CONS. SUO. *Conservatori suo.*
CL. V. *Clipeus Votivus.*
CL. or CLAUD. *Claudius.*
COS. *Consul.*
COSS. *Consules.*
CORN. *Cornelius.*
CUR. X. F. *Curavit Denarium Faciendum.*

D.

D. *Decimus.*
D. M. *Diis Manibus.*
DES. *Designatus.*
D. N. *Dominus Noster.*
D.D. N.N. *Domini Nostri.*
DID. *Didius.*
D. P. *Dii Penates.*

E.

EX. S. C. *Ex Senatûs Consulto.*
EX. A. PU. *Ex Argento Publico*, or *Autoritate Publicâ.*
ETR. *Etruscus.*

F.

F. *Filius* or *Filia*, or *Felix* or *Fecit.*
FEL. *Felix.*
FL. *Flavius.*

G.

GERM. *Germanicus.*
G. P. R. *Genio Populi Romani.*

H.

HEL. *Helvius*, or *Helvetius.*
HER. *Hermenius*, or *Herennia.*

I.

JUN. *Junior.*
IMP. *Imperator.*
IMPP. *Imperatores.*
I. S M. R. *Juno Sospita Mater Regina.*
ITE. *Iterum.*
JUL. *Julius.*
JUST. *Justus.*
J. O. M. SACR. *Jovi Optimo Maximo Sacrum.*

L.

L. *Lucius.*
LEG. *Legatus.*
LEP. *Lepidus.*

LIC. *Licinius.*

M.

MES. *Messius.*

M. *Marcus.*

MAR. CL. *Marcellus Clodius.*

M. F. *Marci Filius.*

M. OTACIL. *Marcia Otacilla.*

MAG. *Magnius.*

MAX. *Maximus.*

N.

N. C. *Nobilissimus Cæsar.*

N. *Nepos,* or *Noster.*

N. N. *Nostri,* or *Nostrorum.*

NEP. RED. *Neptuno Reduci.*

O.

O. *Optime.*

OB. C. S. *Ob Cives Servatos.*

P.

P. *Publius,* or *Pater.*

P. M. *Pontifex Maximus.*

P. F. *Pius Felix.*

PERT. *Pertinax.*

PERC. *Percennius.*

P. R. *Populus Romanus.*

PR. *Prætor.*

PROP. *Proprætor.*

PROC. *Proconsul.*

PROQ. *Proquæstor.*

POMP. *Pompeius.*

P. or POT. *Potestate.*

PERP. *Perpetuus.*

PRÆF. URB. *Præfectus Urbis.*

PRON. *Pronepos.*

Q.

Q. *Quintus,* or *Quæstor.*

Q. C. M. P. I. *Quintus Cæcilius Metellus, Pius Imperator.*

Q. P. *Quæstor Prætorius.*

Q. PR. *Quæstor Provincialis.*

Q. DESIG. *Quæstor Designatus.*

R.

R. P. *Res Publica.*

R. P. C. *Rei Publicæ Constituendæ.*

REST. *Restituit.*

ROM. ET. AUG. *Romæ & Augusto.*

S.

SALL. *Sallustius.*

S. C. *Senatûs Consulto.*

S. P. Q. R. *Senatus Populusque Romanus.*

SEPT. *Septimius.*

SEV. *Severus.*

SEX. *Sextus.*

SEC. ORB. *Securitas Orbis*

T.

T. *Titus.*

TI. *Tiberius.*

TER. *Terentius,* or *Tertius.*

TEMP. *Temporum.*

TR. P. *Tribunitiâ Potestate.*

TREB. *Trebonianus.*

V.

V. *Quintus.*
VIL. PUB. *Villa Publica.*
VIRT. *Virtus.*
VIC. *Victoria.*
VESP. *Vespasianus.*
V. C. *Vir Clarissimus.*
VOT. X. MULT. XX. *Votis Decennalibus Multiplicans Vicenalibus.*

X.

X. *Decimus.*
XIV. *Quartus Decimus.*
XIIX. *Octavus Decimus.*

The coinage of money has always been the right and prerogative of sovereigns; and, if history informs us that other illustrious princes have claimed that privilege, it has not been without the concession or grant of the sovereign. Whilst the Romans were yet a republic, the senate bestowed the right and privilege of coining on the chief magistrate. At the first beginning, they put on their coins the images of deities; then they perpetuated the memory and triumphs of their predecessors: in process of time, when the emperors became sovereign, they granted the privilege of coining only to their nearest kindred, and such as they appointed for their successors; they bestowed that honour generally on their mothers, consorts and sisters. Livia had that favour granted her by Augustus; Agrippina, Drusilla and Julia, had it from Caligula; Messalina and Agrippina from Claudius; Octavia and Poppæa from Nero; and Julia from Titus. This has been done by several others, as may be seen on the medals struck for the same purpose. Vespasian paid the same honour to his mistress Cœnis, and Commodus to his concubine Martia. The Romans were so jealous of this mark of sovereignty, as to restrain their tributary kings from stamping their image on gold coins; not granting it even to the kings of Persia. The Greeks, who, together with their freedom, had a right of coining, lost it when subdued by the Romans, and were obliged to receive and circulate the Roman coin. Thus has the right of coinage, in other nations, been always kept by the sovereign, who granted it, sometimes, as a peculiar favour to others, as did king Antiochus to the Jews.

A curious collector of ancient coin and medals will be soon well versed in the Greek and Roman history. The more he is acquainted with the latter, the greater will be his pleasure and satisfaction in the inspection of the former. He will, likewise, not be a stranger to geography; without the knowledge of which he will find himself much at a loss to understand the coins that relate to colonies, towns, and cities. The study of chronology is another necessary acquisition, whereby he will be enabled to demonstrate the certainty of time, in which either one or other remarkable occurrence has happened. And, as on most ancient coins are seen the figures of deities, he ought to be well acquainted with mythology, which explains the symbols, &c. on the coin, or medal.

Being prepared for the study of coins and medals; we must not be remiss in collecting various kinds, or in drawing such as we have an opportunity of copying, both being highly requisite. But as it may not be convenient, either for want of money or ignorance of drawing, we shall give some useful methods of obtaining copies.

The Art of making Impressions, or Copies, of valuable Coins and Medals.

TAKE fish-glue or ising-glass; cut it in small pieces; immerse it in clear water, and set it on a slow fire; when gradually dissolved, let it boil slowly, stirring it with a spatula, and taking off the scum. The liquor being brought to a sufficient tenacity, take it off the fire, let it cool a little, and then pour it on the medal or coin you intend to copy, so that it may lay about the thickness of a crown-piece upon the medal. This done, set it in a moderate air, neither too hot nor too cold, and let it cool and dry;

when dry, it will loosen itself, and you will find the impression exact, and the finest strokes expressed to the greatest perfection. These you may preserve for your own study and satisfaction, or you may send them, put up in letters, to your correspondents abroad. But this method is surest on gold and copper coin, for sometimes it has been found hurtful to those of silver. You may mix this liquid with various colours, green, red, yellow, blue, &c. If you put a little parchment-size to it, it will make it harder, and answer your purpose the better. In this manner you may make a fine collection, which will answer your study as well as the real coins or medals.

Another, and more substantial, Method.

TAKE a little quantity of lead, tin, and regulus, of antimony; and of copper, a larger quantity. Being melted, cast them in a mould, prepared of burned clay, in which clay you have taken the impression of both sides of your medal, or coin.—Of the method of casting you may be better informed in the *first volume*.

The Order observed in Collections both of ancient and modern Coins and Medals.

THE first class contains the coins of various nations, and those struck by the Roman consuls.

2. Those of the emperors, and their consorts.
3. The Grecian coins.
4. The Hebrew, or Jewish coins.
5. The Syriac, Egyptian, African, and Gothic coins.
6. The coins of the Chinese, the Indians, the Great Mogul, Armenians and Turks.
7. The Christian coin, as the English, Scotch, Muscovite, Swedish, Spanish, French, Italian, Danish, Swiss, Polish, German, Dutch, and those of other countries in Europe, both ancient and modern.

A distinction ought to be made between the subjects of medals, and kept in their respective order; viz. some are struck in the memory of coronations, nuptials, christenings, and burials; others on sieges, victories, alliances, jubilees. One class ought to be set apart for secular, another for ecclesiastical, and a third for curious students in general.

PART II.

A

SHORT INTRODUCTION

TO

THE ART OF DRAWING IN GENERAL;

WITH OBSERVATIONS ON PATTERN DRAWING.

THE art of drawing being little inferior to writing, in its consequences, it is surprising that more regard is not paid to it in the education of youth; since its use is of so great benefit in the transacting of business, in many cases performing what words are insufficient to explain; therefore the cultivation is as necessary as that of writing. What trade, manufacture, art, or science is there in being, where drawing and designing is not requisite? He who is skilled in it, has the advantage over him that is ignorant of it. I do not propose that every man shall be a painter; but the practice and knowledge of some particular branch, which seems best to correspond with the business he is to follow, will be of singular service and advantage, and qualify him to be a competent judge of work. He will form a just idea of the building of ships, and their rigging; of the architecture of a stately building; of the disposition of gardens; of sculpture, painting, engraving, &c.

The foundation for the acquisition of this art must be laid in such a way, as to lead him gradually from one step to another, till, having surmounted the first rules, he may, by assiduous practice, make himself a good proficient, and have the satisfaction of reflecting, that his industry, study, and labour, have not been bestowed in vain.

The art of drawing and designing being divided into various branches, it will be requisite for such as do not intend to draw figures, landscapes, flowers, &c. after nature, to make themselves thoroughly acquainted with the rules of geometry and perspective; which acquisition will fit them for drawing buildings, parks, gardens, views, and whatever may require an exact measurement and division, either of a plan or elevation. But, as it is not my intention here to enlarge upon that subject, the reader may find instructions in the first volume, relating to the art of drawing in perspective. And as my present design is to introduce him to the art of drawing after nature, I shall freely present him with such instructions as may give him encouragement to pursue the practice with pleasure and satisfaction.

First then, you will observe, that, although I do not deny your having rule, compass, and other instruments near at hand, I hope you will make as little use of them as possible, and rather do without them: for your eye should be accustomed to judge of true proportion, without artificial measuring. The most necessary implements you are to be provided with for drawing are the following:

1. Charcoal split into shivers, and pointed with a penknife; the best for this use is that burnt of hazel. 2. Black-lead pencils. 3. Black chalk. 4. White chalk. 5. Red lead. 6. Pastils, or crayons, of several colours: the preparing and making of them shall be taught hereafter. 7. Paper, both fine and coarse, blue, brown, carnation, and other colours. 8. Indian ink, camel's-hair pencils, crow-quills, &c. Being thus provided, you may set to work with a good heart, and a full resolution to pursue what you have begun with assiduity and diligence.

Proportion is the grand basis of drawing. This may be illustrated by several figures, viz. the circle, the oval, the square, the triangle, the cylinder, &c. Each of these have their different effects; as, for example, the oval directs the true proportion of a face; the square shews plans, buildings, fortifications; the circle expresses all orbicular or round shapes; the triangle gives the figures of three sides; the cylinder, pillars, columns, &c. The copying of these will be easy; and, to bring in your hand, you may furnish yourself with prints for that purpose. Having made some progress by easy tasks, and learned to handle and manage the charcoal, pen, and pencil tolerably well, you may then venture on the several members of the human body.

The first attempt to draw a face is with an oval, which is to be divided according to the several turnings, either front, sideways, looking up, or down; then placing the eyes, nose, mouth, and eyebrows in their proper places. If the face is in front, divide the middle with a perpendicular line, and the whole length, again, into four parts; the middle line divide into five parts, which is computed to be the measure of five eyes, of which the two temples, together with the width of the nose and eyes, make the five parts: the line over it divides the forehead, where the hair begins: even with the eye-brows, begin the ears, ending where the lower division is marked for the nose; and a little below it is placed the mouth: for your instruction. See plate II. *fig*. 2.

In the next place, advance to the several parts of the human body, (after some good drawings, prints, or paintings,) beginning with the eyes, nose, mouth, ears, hands, feet, legs and arms, and, last of all, the trunks of both male and female. Having advanced thus far, you may then more boldly venture on whole figures, (after good prints, or drawings,) of men, women and children. Here you ought to be doubly diligent, and exert your genius and talents to shew what improvements you have made since your first attempt. Let the print you intend to draw lie before you; and, if you can conveniently place yourself so to the table, as that the light from the window may fall from your left to the right hand; then square your paper with a ruler and black lead pencil, after the exact measure of your print; and having your coals ready pointed, and your other implements at hand, observe, first, the distance of the figure from the lines it is framed with; then begin from the top of the head, and with a sharp-pointed coal trace out the out-line of the face, so as hardly to be discernible; having a feather at hand, you may wipe out what you see is wrong, and amend the faults with your coal, until your copy is like your pattern. The head being finished to your liking, observe the distance from the framing of the whole figure, and with soft and tender touches mark out those distances in the frame on your paper, examining it carefully, and correcting such strokes as are either too far aff, or too near your framing. Being pretty well satisfied with your rough sketch, you may then proceed with your pointed coal; and after the head, copy the rest of the parts of the figure to the pattern before you, as near as possible. A cross, gently drawn with a pointed coal, or framed with thread (*See plate* II. *fig*. 3.) within the frame of the pattern, and another within that of the paper whereon it is to be copied, may be allowed to learners, in order to direct them in keeping the true distances of the parts of the body; though, it must be confessed, that the doing it without is more to their credit. Lastly, I must beg young beginners will not be discouraged, though their performance do not afford them the content they wish; daily practice, with assiduity and care, will, in time, crown their desires. The first draught being made with charcoal, and ready to be finished, the best method for beginners will be to make use of a crow-quill pen, and black Indian ink, well mixed together, and ground with a muller on a flat stone, or Dutch tile, and then tempered with clean water, to make it fit to write or draw. With this you mark the out-line after your pattern, without regarding the shadowing it: if your pattern is only an out-line, it will be the better, as you will finish your piece after it with more ease. Suspend the practice of shadowing your pieces, for some time, till you have made a remarkable progress in drawing a true copy of an out-line; and being thus far advanced, you may then take the following directions for the management of your shadows.

There are various methods made use of for drawing and shadowing, and the practitioner may make choice of that which seems best to his liking. If you copy a print, and intend to shade it with the pen, in imitation of your pattern before you, make choice of such prints wherein the strokes of shadows are executed with a bold and free graver. It will be adviseable before you proceed to the shadowing of your piece, first to exercise your hand in copying those etchings in plate III. fig. 4. that by the management and turning of the pen you may shew both the strongest and softest shades, that is, the coarsest or finest part of one stroke. Having made parallel single etchings, be careful not to cross them before the first etchings are dry. Some artists who have acquired a habit of shadowing their work in this method, have deceived even connoisseurs; and their performances have been taken for real copper-plate prints. I remember a piece curiously finished with the pen by Mr. Guin, an ingenious young gentleman, whom I saw copy it after the print of Mr. Hogarth's, representing king Richard III's tent. It is a very curious performance, and there is hardly any one but, at first sight, would take it for the print itself. But, however curious this way of shadowing is, it is very tedious, and he who is not endued with a good share of patience, should never attempt to pursue it. This sort of etching is best performed upon vellum.

Another method of shadowing, especially small pieces, is performed by making use of Indian ink, which first with clear water you rub upon a Dutch tile, or on a piece of glass, and then, having a cup or two with clean water standing near you, one to wash your pencil in, and the other to temper your Indian ink, by little and little, on the tile, begin to lay on your shadows, very faint, with one pencil, and with another clean, and only moistened by your lips, drive that shadow, to vanish by degrees in the light, then, that first shadow being dry, proceed to deepen it, by tempering your Indian ink darker and darker, till your piece has the desired effect, and comes up, as near as you can, to the copy before you. The Italians have a method of finishing little oval pieces for snuff-boxes, the drapery with Indian ink, and the flesh with a reddish colour, which they first shadow in the above manner, by washing, and then give it a finishing stroke with dotting. Some artists have excelled in drawing and shadowing with Indian ink, to admiration, in miniature, and their pieces have been of great value. For this way of performing, you must make use of superfine paper, glazed by a card-maker, or else you may do it yourself with a polisher, or a piece of a broken bottle, laying the piece of paper between another that is thin, then rubbing it with your polisher on a flat stone, or, for want of that, on a smooth board. This will flatten and polish the paper, and your work will lay much smoother than otherwise.

A third method is, drawing and shadowing with a black-lead pencil. This is not only the most quick, but the most pleasant and ready way: portraits, figures, landscapes, cattle, birds, &c. may be finished to admiration: a good proficient will manage the shadowing well, and keep the perspective and distances in their proper order and strength, so as by degrees to determine with faintness, and, in the end, vanish from the sight. This is generally performed by little cross etchings, one over another, from the faintest to the strongest shade. You may do it on paper, but vellum is preferable.

What I have advanced with respect to the different methods of shadowing, relates only to high-finished pieces in miniature, where figures, and other subjects contained in the picture, are small. But when the shadow is to be done expeditiously, especially in larger pieces, the most useful method is to draw first the out-line with black, or a deep brown, or chocolate colour, and then wash it with bister or soot, which first being boiled in clear water, affords a pleasant colour for shadowing: you must get the soot from a baker's oven, or where they only burn wood. When you use it, temper it according to what deepness or lightness you please, and, with a pretty large pencil, lay on your shades, bold and expeditiously, keeping up as much as possible to the light and shadow of the drawing before you.

Having made yourself tolerable master of copying after prints and drawings, you may attempt to try your success in solid figures; I mean such as are cast in plaster of Paris, or cut in wood or stone, or cast in brass, lead, or copper. Here you begin also with copying, a head, a hand, an arm, a foot, a leg, a trunk, separately; and, lastly you may venture upon a whole figure. This sort of drawing is performed best by the light of a lamp or candle: the shadow will be stronger expressed, and you will soon, by application and assiduity, be more expert by copying after them, than after prints or drawings. As your fingers will require a bold stroke, you must choose a substantial paper for that purpose.

After some practice in copying such things as I have noticed, you may, if you have an opportunity, visit the academy, where you may still make a farther improvement by drawing after the life. This is likewise done by the light of a lamp. The person to be drawn is placed in various attitudes or postures, in the middle of a room; the artists sitting round, every one draws him, or her, in the position presented to his view. This way of drawing and shadowing is generally performed with black chalk; as are those drawings after plaster of Paris. Some make use of brown, and other coloured, paper, but, as blue paper answers the end for dispatch, there is no great occasion of any other: observe, when you have finished the out-line and shadow, that you touch the lights with white chalk.

There is one way more, which is, the drawing and shadowing with red chalk; you may, by a little practice and pains, become master of the art, and produce admirable pieces. I have seen some by Italian masters, that have been very much admired, and of considerable value. There are two methods of working, one is, to etch your strokes, in shadowing, like those done by the pen, or a copper-plate print; the other is, to rub in the shadows with a leathern stump, and then to finish the strongest touches with pointed red chalk. You must be very careful of your work to keep it from being soiled, and likewise in the choice of your red chalk. The paper must be superfine, without knots, and very stout.

Having given ample instructions to such as have time and inclination to attain the knowledge and practice of the art of drawing, I shall endeavour to shew how any one, willing and desirous, may imitate what he sees before him; as the figure of a man, woman, or child; a horse, cow, sheep, or dog; and fowls, fishes, snails, insects, &c.

To take a perfect Copy of any Print, Drawing, or Picture.

TAKE a sheet of the finest white paper; wipe it all over with sweet oil, and let it soak in for two or three hours; then get some bran, and with it rub off all the oiliness remaining upon the paper, and it will be fit for use. Then lay it upon any drawing, painting, or print, and with a black lead pencil, or a piece of soft charcoal, or a pen and ink, draw the out-line: this done, get a clean piece of paper, on which, by means of another paper (which is prepared for that purpose by rubbing it with vermilion or black lead dust, mixt with a little fresh butter, only on one side, with a rag,) you may trace the oil paper draught with a blunt needle, and finish it afterwards with shadows, according to the pattern before you.

Another Method.

HAVING drawn the pattern or print upon an oiled paper, as has been directed before, lay it on a clean piece of paper, and with a pricker (a needle fastened into a little stick), prick over all the strokes you have drawn with the black-lead pencil: then take off the oil-paper, and laying the pricked white paper on a clean sheet, rub it over with finely powdered charcoal, with a little stump, or roller, made up of a narrow slip of cloth, or flannel; draw it over with black lead, ink, or any other colour you like best, and finish it in what manner you would have it.

Another Way.

TAKE a piece of clear lanthern-horn; lay it upon your print, or picture, then with a crow-quill, dipt in Indian ink, draw every stroke of the out-line upon the horn; when dry, breathe upon that side of the horn whereon you have made your draught, three or four times, and clap it directly on a damp piece of clean white paper, with the drawn side downwards, then pressing hard with the palm of your hand, the drawing will stick to your paper, and the horn come off clean.

Another Way.

TAKE a sheet of white paper; rub it all over with lamp-black, mixt with fresh butter; then dry it in the sun, or before the fire. Lay this, with the black side downwards, on a piece of clean paper, and upon that the print or drawing you intend to copy, and trace the out-line with a brass bodkin, or a tracer, made on purpose, of a piece of wire, of iron or brass, or of a blunted large pin, set into a small round handle, such as the engravers make use of for etching, and you will have every stroke delineated ready for your colouring.

Another Device for small painted Pictures.

TAKE lake; grind and temper it with gum-water; and with a pen, or pencil, draw all the out-line. Then, after having wetted the back of the picture, press it hard upon a sheet of damp white paper, and it will leave behind all the strokes you drew with the lake.

An easy Method either to enlarge or diminish the Size of a Picture or Print you wish to copy.

FIRST take a square pane of crown-glass, and divide it at the sides, as well as at top and bottom, in equal parts; then, from each division, draw with the lamp-black-ink lines from one side to the other, crossing it from top to bottom, and you will have the glass squared of the dimension you think fit: this done, lay the glass upon the print or picture you intend to draw, and as many squares as the print or picture takes in, so many divide your paper into, on which you intend to copy it; if it is to be of the same size, then you take the same measure for your division; if you intend to make it larger, you must order your measure accordingly; the same, if you intend to make it less. You may see the nature of this performance more plain in plate III. fig. 2. 3.

How to make a Drawing-desk.

CAUSE a frame to be made of a reasonable size, so that a pretty large piece of crown-glass may rest upon it, supported by a ledge at the bottom part, where, by two hinges, it may be fastened to a drawer of the same dimension, which may be divided to serve for pen, ink, and paper, and other small utensils or instruments for drawing. To the top of the frame fix two stays, by which the frame may be raised higher or lower, as occasion shall require. This direction will appear plainer in plate III. fig. 5.

The manner of using this frame is thus: lay the print, or drawing, you intend to copy, on the glass, and fasten a sheet or piece of fine white paper, with some wafers or paste, upon it: if it be in the day-time, place the back, after you have raised the frame to a proper height, against the window; but if night, put a lamp behind it, and you will see every stroke of the print or drawing, which, with your pen, you may copy very accurately, and finish according to the manner you think proper: if it be a solid piece which you intend to copy, then place it behind the desk, and having fastened your paper on the frame, put the lamp so as to produce a strong shade on the object you have before you to draw, and you will plainly see to trace the shape with your pen or black-lead pencil; after which, shade it in the manner it appears to you without the desk.

Of designing and drawing of Ornaments, Models, and Patterns, with Foliage, &c. for Patterns, flowered-Silks, Embroidery, and Printing.

IT is not my intention to launch out into a detail of the various kinds of manufactories wherein drawing and designing of ornaments, leaves, flowers, &c. is required, but confine myself only to those of weaving, embroidery, and printing. I cannot be altogether reconciled to the sentiments of those who maintain that the art of designing and drawing of ornaments, is by the moderns performed in greater perfection than by the ancients, since it is evident that the ornaments, invented by them for the embellishment of architecture, and other remains of antiquity, is to this day strictly observed, and imitated as a standard in all our grand and elegant modern buildings. And if time had preserved some remains of the rich embroidery and weaving, worn among the Grecian and Roman ladies, on solemn occasions, we might perhaps not think it below our skill and ingenuity to copy and draw patterns after them, for the admiration of our modern ladies, who would be naturally inclinable to admire and favour the ancient modes, by rescuing them from oblivion, and by introducing such fashions again, with improvement to their former splendor and original beauty.

The French designers of ornaments have been, and are at present, esteemed the most happy in their inventions. Their natural freeness of composition is really admirable, and suited to the purposes intended, without crowding things together; they display them with a careless air, beauty, and delicacy, so that all the rest of the European nations take the French fashion of ornaments for their rule and pattern to imitate. It is on this, and no other account, that some of our ladies of quality are so fond of French silks, otherwise the manufactories of England are preferred. However, our weaving manufactory, especially in the flowered way, is of late years so much improved, that few ladies prefer a French brocade to one which is manufactured in Spitalfields, or at Canterbury; except it be such as are very rich.

If, then, such improvements are made, it may be required, what can be the reason that there still remains a fondness for French patterns, when with ease we might be supplied with designers, or pattern-drawers from France *? In answer to this we may give the following reasons.

Every fabricant, or manufacturer at Lyons, in the flowered way, though he employs several hands in drawing of patterns, is a pattern-drawer himself; and, qualified as such by his judgment, he has the whole management under his own care and direction. On the contrary, in England, take London and Canterbury together, there are few manufacturers thus qualified.

A good designer, or pattern-drawer, meets with more encouragement and constant employ in France, than he would find here; for there he sells or disposes of his designs, not by measure, at so much per inch, but by his merit. Here the most ingenious artist is put upon a level with the meerest bungler, who is frequently made preferable, and advanced in his room.

In France, when once a design is fixed on and approved, it becomes a fashion, and is followed by the manufacturers for a considerable time, till, by consent, it is thought proper to introduce another. And likewise,

"The great demand for French gold and silver brocades, and flowered silks, at most courts in Europe, was of great

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* Especially now, when the unhappiness of the times has made so many emigrate from France. *Ed.*

advantage to the French manufacturer, who, on that account, was enabled to be at more expence in mounting a loom, being sure to keep it employed till the tackle was worn out, and the loom fit to be mounted by a new pattern. Here, on the contrary, the manufacturer has not that advantage, since what he doth is chiefly for home consumption; and it frequently happens, that when a pattern is fixed upon by the mercer, the weaver, after a great expence in mounting the loom, is, perhaps, ordered to put it down, before he has delivered more than one or two pieces.

Some weavers, to shew *their own* taste and judgment, will frequently cause a pattern-drawer to alter a good design, by taking out such and such flowers and leaves as they dislike, putting others in the room of them; by this means they murder the design, and make it deformed, without any coherence, taste, or humour, with which the pattern-drawer is obliged to comply, if he values his custom.

I could muster up several other reasons, why, for the generality, English patterns are not liked so well as the French, but to sum up all, it is, because they, for the most part, are not so well executed in the loom.

I am a real well-wisher to the silk-manufactory in general, but more especially to the flowered branch, and I could wish that every master-weaver was a designer or pattern-drawer himself, or had at least some knowledge of the art of drawing, so as to describe his own thoughts to the pattern-drawer he employs, by rough sketches, and, thus, by mutual consultation, bring things to bear, with pleasure and satisfaction to both parties.

My advice therefore is, for every manufacturer who intends to bring his son up in the draught branch, to keep him from his infancy to drawing. Children who busy themselves, after school-time, in the occupation of one thing or other, generally discover an inclination for drawing,

ing; and if they are supplied with a few halfpenny prints of various kinds, with a few pencils and colours, it will set them up, and they will, with a little encouragement, advance and make some improvement in drawing and colouring birds, flowers, beasts, houses, trees, &c. or any thing they are delighted with most. Thus, they may, by degrees, be fitted to be put to a drawing-school, or have a master to attend them at home; nor will it be amiss, after a lad is pretty well versed in drawing, to place him for some time with a flower-painter, where he may be instructed in designing, colouring, and shadowing of natural flowers and ornaments; and after this, in his apprenticeship, he will be qualified to employ both his genius and hands in drawing, and colouring of patterns. I shall attempt to shew the qualifications a designer or pattern-drawer ought to be possessed with: and first, he ought to be well versed in drawing of all kind of things; have a true notion of symmetry and proportion; and, above all, excel in drawing of ornaments, and natural as well as artificial, and imaginary or ornamental, flowers.

His fancy ought to be unlimited, neither strictly tied to, nor departing or swerving entirely from, nature. It is from the excellent genius of an artist, that we see extravagant varieties, or admirable novelties in patterns; the eye is charmed, the mind is filled with delight, and our judgment is persuaded that the produce was not derived from a narrow conception. His imagination must be strong and lively, and, like the poets of old, transform things into various shapes, yet not exceed the possibilities or beauties of nature; that is, he must not give the size of a cabbage to a rose, nor that of a pumpkin to an olive; yet this was, I remember, not many years since, the prevailing French fashion among our English ladies.

A good designer or pattern-drawer will scorn to make use of the pitiful means of many pretenders, viz. to copy, tear, and pillage other men's performances limb from limb, in order to compose a figure which they call their own, and are not a little proud of it. This has, to my knowledge, been, and still is, a frequent practice, by some of our modern pattern-drawers, and the taste of our English ladies prevails at present in their favour.

He ought not to be a stranger to the science of geometry, and the rules of true proportion. this will qualify him to form a right judgment of what he sees in others, and to give sufficient reasons for his own performances. He ought to follow the principle Mr. Hogarth gives in his Analysis of Beauty, observing the serpentine line, so as to make it the foundation and support of all his designs, in ornaments, flowers, branches, leaves, &c.

To conclude, a good designer or pattern-drawer ought to be well acquainted, not only with the implements belonging to a draught-loom, but also with the nature and management of mounting the same, and to see that the artist employed be an ingenious, just and honest man, for many have formerly experienced the ill consequence of employing journeymen who through selfishness, sloth and idleness, mangle and spoil the best design, though well executed by the pattern-drawer.

Before concluding, observe there is one great and material mismanagement in the flowered silk manufactory, which is, the employing too often such hands in copying good designs on the rule paper, as were never brought up to it, and know little or nothing of the art of drawing: this is a grievance, often complained of. This shews how necessary it is for a manufacturer to have acquired those qualifications mentioned before.

Of the various Kinds of Flowered Silk.

A GOOD designer and pattern-drawer for the flowered silk manufactory, is to be well acquainted with the different sorts of works, and regulate his designs, and patterns accordingly: of these the following are, among a multitude of others, the principal sorts.

1. Gold and silver brocades.
2. Grand designs for gold, silver, and silk brocades, or stuffs.
3. Gold and silver tissues.
4. For paduasoys, and double ground brocades.
5. For lutestring brocades.
6. For damasks.
7. For flowered velvets.

The taste of patterns changes with the times; they were, according to the fashion, once brought over from France, and set on foot by our own manufacturers, if approved of by the court and other ladies of quality and distinction. A general rule ought to be observed in the management of patterns for every particular sort of flowered or brocaded silks: for example,

1. *Patterns for gold and silver brocades* ought to be composed of ornamental stalks, leaves and flowers, bold, solid and free, and, according to the richness, spread in more or less branches; here the pattern-drawer is under some restraint; on the one hand, to save the waste of silver on the wrong side of the silk; and, on the other hand, to keep the number of shuttles, or the workmanship, as low as possibly he can, except it be in very rich stuffs, where the price of workmanship is not minded, whether it be more or less.

2. *Grand designs for gold and silver stuffs with colours* are commonly pretty full of work, especially when designed for waistcoats: the gold and silver should always be ornamental, intermixt with mosaic, and, at proper places, set off with some plate. But the silk brocade must be composed of the smaller sort of natural flowers, coloured and shaded to the greatest perfection. Sometimes shapes of waistcoats are only brocaded with rich borders down each side, and the pockets and flaps, together with the

ends of the sleeves belonging to it. For this the shape is cut on paper, after which the pattern-drawer contrives his design, by repeating the length of it, which never ought to be above six inches.

3. *Gold and silver tissues* are commonly drawn with large ornamental flowers and leaves, sometimes inclining to imitate nature, the ground-work is frequently filled up with mosaic-work of one sort or other, sometimes silk flowers are introduced, but they must be small and few.

4. *Paduasoys and double-ground brocades* require a grand look, the flowers and leaves are generally natural, and as much as possible to imitate embroidery. Sometimes the brocades are worked on a paduasoy double tissue, the colour of the figure whereof is commonly that of the ground, and the device of a running trail, or ornaments with mosaic, or any think that may be pleasant and agreeable to the eye. The flowers and leaves are in some such brocades blue, red, green, yellow, or straw-colour, heightened with silver, and a deep orange, with gold.

5. *Lutestring brocades* are either upon a plain or figured ground; the design must be open and airy, composed of various sorts of flowers, carelessly disposed and garnished, care must be taken to prevent, as much as can be, the expence of workmanship, and yet to make as great a show for the money as possible. There are likewise lutestring tobines, which commonly are striped with flowers in the warp, and sometimes between the tobine stripes, with brocaded sprigs. Some have likewise a running trail with the colour of the ground, as other lutestrings.

6. *Damask patterns* require the boldest stroke of any, the flowers and leaves should always be large, and the small work omitted as much as possible, except it be in the middle of a leaf or a flower. An attempt was made to introduce small flowers for the fashion, and a great number of looms were set to work accordingly; but this fashion was soon over, and the large designs continued in vogue, nor

will a damask figure of whimsical fancies be of long continuance. Several attempts have been made that way, but without success. A bold stroke with the line of beauty, and well shaped stalks, leaves and flowers, natural or imaginary, are the only things a designer has to observe in compleating a well-designed damask pattern.

7. *Flowered velvets*, except those designed for furniture, are commonly but small designs; the uncut bordering the cut velvet, the ground is but little seen, which is satin, and is chiefly designed to part the flowers and leaves from each other. The patterns for velvets are drawn much in the same manner for gentlemen's wear; but when for a lady's winter dress, they are done with an open ground, and larger flowers. From what has been advanced it will appear that ornaments, stalks, flowers, and leaves, are the principal objects in designing of weaving patterns; these seem the most becoming for embellishing a lady's dress; and notwithstanding that for many years past, the manufacturers have puzzled both their own, and tortured the pattern-drawer's brains to contrive new fashions and uncommon devices, and have endeavoured to change the face of nature, by introducing whims and maggots of their own, they have seldom succeeded; but nature has always had the pre-eminence, and her charms have ever prevailed, and been the admiration of a brilliant court.

Whims have been carried to an extravagant rate, and no jack-pudding on a mountebank's stage ever had more ridiculous trumperies on his jacket, than have been imitated on silk. Pitchforks, and hangers, ropes and ladders, sea-shells upon trees, have been, by some weavers, thought proper devices for a lady's dress. A manufacturer, mercer, or weaver came to a pattern-drawer in Spitalfields, and ordered him to draw a pattern for a silver brocade lutestring; the pattern-drawer made several sketches with charcoal on a piece of paper; but none pleasing his customer, he asked him, what he would have him draw. The servant-maid happening to broil some sprats on a gridiron, the customer, pointing to the chimney, said, "*draw the* "*gridiron and sprats*, it will make as odd a pattern as you "can think of." His order was obeyed; the pattern was drawn; approved of; put into the loom; manufactured; and had the desired end: it was a good pattern, because it was odd, and it sold well.

But why should we plague and torture our brains for whims of our own, when nature has so bountifully furnished us with endless varieties of subjects, which only want to be well composed, by a bright imagination and an artful hand! Every season of the year produces plants, flowers, and shurbs, affording far greater variety than we are able to imitate. The spring opens her bountiful treasure every year, and clothes and enamels the earth with endless charms of beauty; she invites us to imitate her as near as possible in all her splendour. Here the sweet blossoms of the almond, the peach, the apple, the pear, plumb, cherry, and innumerable other trees and shrubs, afford us subjects without number; the green meadows, fields and gardens, abound with the greatest variety of flowers: the tulip, hyacinth, ranunculas, &c. &c. are then in their greatest beauty; and what is the reason manufacturers do not exert their skill in furnishing ladies with dresses suitable to the spring, and garnish them with the sweet blossoms and flowers that season affords?

The summer will in like manner furnish a manufacturer with a vast variety of new and beautiful objects; for the colours of that season, and its fruits and flowers, if well combined by the artist, and distributed to the best advantage, will charm the eye, and raise the admiration of a curious beholder. The autumn changes the scene, and exhibits to the view different sorts of flowers, and a vast variety of charming and delicious fruits, which enable the manufacturer to produce an imitation in his silks, and make it a fashion for the season. Last of all, the winter invites us to make choice of evergreens, and to visit the green-houses, stowed and crowded with varieties of exotic plants of surprising shape and beauty. This gives a manufacturer abundantly more objects than he can have occasion for, to introduce a new and admirable taste for the fashion of the winter season.

But if the manufacturer will change the fashion of natural flowers into whims and chimeras, then the best taste for patterns of that kind is that of the Chinese, who in their pictures, and other ingenious performances, discover an excellent genius, and may supply the imagination with vast variety. The taste peculiar to that nation will allow us to introduce birds, butterflies, houses, fish, and many other things, which, in the flowered way, would not look so well; and, except highly finished, absurd and ridiculous.

To conclude with one more observation with respect to pattern-drawing; viz. the timorousness of the manufacturer, and his apprehensions lest others should gain the advantage over him by their patterns. He thinks a fresh hand will do wonders; for this, if he is a man of note in the trade, a *new pattern-drawer* is soon to come into vogue, and the *old experienced one* is to be discarded. It is a great discouragement for an artist to exert his abilities, seeing he is slighted, his livelihood frustrated, and himself forced to seek out for other employment, to maintain himself and family.

We shall now give a short detail of the manufacturing or weaving of flowered silks in the loom, not doubting but that it will be acceptable to the ingenious reader.

The first and principal concern is the choice of a pattern; in this the manufacturer takes some time to deliberate, and in order to satisfy and please his own fancy, which every one thinks to be the best, he causes such alterations and amendments to be made in the model by the pattern-drawer as seems best to his judgment and liking. After which it is drawn and painted upon paper, on which are squares printed from copper-plates; these squares are again subdivided, to answer the threads of the warp which run lengthways in the piece, as likewise of the shoots; and the pattern, for the whole breadth of the work, is drawn sometimes for 1000, sometimes for 800, and sometimes for 600 cords. The more cords a pattern is drawn upon, the more curious and the finer the work will appear, in the shape of flowers and leaves: those who stint the warp to 600 cords, will not only bring discredit upon the pattern-drawer, but likewise on the manufactory itself; for, were the same model to be mounted in two different looms, the one of 1000, and the other of 600 cords, the latter would appear to a vast disadvantage to be viewed with the former. As it is in the warp, so likewise is it with the shoot. The larger squares in the ruled paper for the warp are, for the generality, divided for 8 cords, but for the shoot in 8, 9, 10, 11, 12, to 16 lines. The manufacturer having made a proper calculation, according to the nature of the work, orders the pattern to be drawn upon 8 and 8, 8 and 9, 8 and 10, and the like, and for 1000, 800, or 600 cords; which being done according to order, the pattern is sent to the pattern-reader, who having a frame prepared with such a number of cords as the pattern is drawn for, and having placed the same under it, he, or she, works the flowers, by crossing the warp with other cords, each colour separate: thus going through the whole length of the pattern, it is taken altogether out of the frame, and carried to the journeyman-weaver, who then transfers the lish or cord the pattern-reader employed for the shoot, to the same number of packthreads of the warp as are fastened to one side of the loom. Every thread of the warp is by the enterer conveyed through a loop, which has a small long weight or lingoe hung below, to counterbalance the packthreads that go from the top of those loops, and are passed over pullies in a table directly over the loom, which contains as many pullies as there are threads to the warp, and which are continued in a horizontal position on one side of the loom, where they are spread on a cross piece, fastened to two staples. These are called the tail of the mounture; and from each of these packthreads, just by the side of the loom, are fastened other packthreads, called simple-cords, which descend to the ground. To these the journeyman transfer the lish or cord he had from the pattern-reader; so that by pulling these simple-cords, all the threads that are expressed in the shoot of the pattern are raised, and are read in accordingly by the pattern-reader. To do this, they fasten a loop, or potlart, to as many of those simple cords as there are threads of the warp to be pulled up at every shoot, or every throw of the brocading shuttle. To distinguish the changing of colours, in brocading them, they fasten a piece of worsted, or silk, to the loop, of the same colour the workman is to use; and the draw-boy, when he pulls that loop, names the colour which comes next to be changed, to give notice to the weaver at the loom to take the proper shuttles.

Patterns for Embroidery.

Patterns for embroidery are contrived to be adapted to the several purposes they are designed for; if intended for gold or silver, then they are commonly composed of ornamental foliages, leaves, flowers and trails. The designs for embroidery of gentlemens clothes ought not to be above six inches long; and if they can be brought into a shorter compass, it is so much the better, as the repeating them in a border will be more agreeable. The judgment of the designer ought to shew itself in embellishing the work with plated gold, spangles and twist, and contriving varieties of bendings and turnings; of which he is to consult the embroiderer, who can give him the best light, and inform him what is practicable for him to execute. Some, if not most, gold and silver embroidery is first done upon vellum, which is cut out in proper shapes, according to the pattern, and then sewed to the velvet or cloth; after which it is embellished by the embroiderer with some small works of plated gold and silver, in mosaic work, spangles, &c. which fashion of late has very much prevailed. The designer is likewise from the same pattern to contrive the shapes for the sleeves and pockets, so as to correspond, and join together, without a perceptible breaking or confusion. Care must be taken to draw the pattern exact and well upon the velvet, silk, or cloth, by which the embroiderers are guided to perform their work.

As of late years great improvements have been made in the silk weaving, the embroidery in silk has not been so much in vogue as it was some years since: what, however, is done in that way, in imitation of natural flowers, nothing can exceed, on account of the beauty and colours. The designs for this work are drawn only with an out-line, shadowed with Indian ink, then pricked with a needle, and pounced with charcoal dust, on white, and powdered white chalk upon dark or coloured grounds, and then drawn with a pen. The embroiderers being guided by the shadowing of the pattern, pitch upon colours suitable to each flower or leaf, and work their shades accordingly. Every embroiderer ought to be very well qualified in drawing, or at least able to form a good judgment in the choice of a pattern, it being a chief object to strike the eye with admiration; and, on that account, he is to spare no cost in the purchasing of good designs, as they may be the means of establishing his credit and reputation.

Patterns for Callico-Printing.

WITH respect to drawing of patterns for the callico-printers, they are, for the generality, in imitation of the flowered silk-manufactory, with such variations as may best answer the nature of the different sorts of works, of which there is great variety. The principal are the whole chintzs, in which they imitate the richest silk brocades, with a great variety of beautiful colours: these make the best appearance on an open white ground. The fashion, as with the brocaded silks, has run upon natural flowers, stalks and leaves; sometimes intermixt with ornaments, after the French taste, sometimes in groupes or festoons of flowers or fruit, or in sprigs and branches carelessly flung, in a natural and agreeable manner. Of late, the ground has, by some printers, been dyed of a cloth colour, and the white has only appeared in the heightening of the flowers, and in the ground-colour, where it is preserved by a paste, in imitation of a silk tobine: this makes, especially when first new and glazed, a very rich and handsome shew. In like manner blue grounds are done, which is more lasting.

Black, or dark-ground chintz patterns are done with the same variety of colours, but differ from the former, in the ground being more closely covered with flowers and leaves, and the white being preserved in the heightening of them. This has a great effect, if well managed by the pattern-drawer, and by the hands it must pass through in the printing. Great improvements have of late years been made in this art, and chintz printed in England, has for art and beauty, surpassed any that has been brought from the East-Indies. These chintz patterns are generally drawn and painted with three reds, two purples, blues, greens and yellows, from which, being blended one with another, a variety of other colours are produced, so as to appear upon the cloth like a curious painting; for by that means are introduced the crimson, orange, olive, buff, chocolate, and several other changes and shades.

Next to the whole chintz are the half chintz: these differ from the former, in that they are printed with only two reds, and no purple. The patterns that serve for one, will, in the management of the printing, serve for the other, both with respect to the white, as for the coloured or black grounds.

We now come to patterns for five colours; these are drawn with one, or a full single red; and a black out-line for all the rest of the colours, as blue, green and yellow; sometimes the yellow is shadowed off with the red. Both white and black grounds are printed in these colours, in stripes, sprigs, or other whimsical fancies.

Next to these in order are the three coloured patterns; these are intended for the common or coarse cottons, on account of the small variety of colours, which consist only of black, red, and blue; and the pattern-drawer is obliged to make as much shew as he can in his design. However, some work of this kind has been done on fine cottons, in imitation of needle-work, to great perfection, and worn by ladies of the first rank and fashion, for a dishabille or undress.

To these three-coloured patterns we may add those for two purples, and blue.

The last of all are the single purples: these are commonly done with small flowers, some with an open ground, and some much covered. Some patterns are with running trails, others are set, and in sprigs; some are for white, and some for black, or shagreen grounds. In short, there is no end of fashions and changes, which of course must cause great study, and labour to a pattern-drawer.

The art of callico-printing having arrived in England to as great perfection as in any part of Europe, with respect to patterns, beauty of colours, and curious workmanship, it may be agreeable to the ingenious reader, and to the lovers of useful improvements, to give a short account of the conduct observed in the management, through all its branches, from the weaver's loom, to the draper's shop.

In the latter end of the reign of queen Anne a duty was, by act of parliament, laid on all printed silks, callico and linens; and at last, the printing of *callicoes* was prohibited, except such as were to be exported abroad. The printing business was by that means for some time interrupted, because *linen* had never before succeeded in taking good colours, till some of the printers, by their assiduity, conjectures and study, found out a method. And in order to improve it still more, several manufactories were established at Manchester for the weaving of thread-cottons, in which they so well succeeded, that now they are hardly distinguishable from a fine callico. This has proved a great advantage to printing; and that business has ever since encreased to admiration, by the encouragement and particular favour of the fair sex, who find that nothing is comparable to a well-printed fine cotton for a dishabille or undress; the cleanness and beauty of which they can so easily renew.

But to come to the purpose intended: after a thread, cotton, or linen is wove, it is sent to the wholesale draper in London, and is by him delivered to the printer, who has it conveyed back to his warehouse.

The printer having received the linen-draper's orders about the patterns, puts the pieces, after they have been stampt by the king's officers, to his people, to prepare them for printing, by well cleaning and bucking them in the river, and otherwise galling, drying, and calendering them for the colours they are intended for. Thus prepared, the pieces are carried to the printing-shop, where the journeyman receives his orders to print so many pieces with the print of No. 1, 2, or whatever other number the print he has orders for is marked with. Here I must not omit an essential branch belonging to the execution of the printing business, (next to preparing of colours, and pattern-drawing,) and that is, the *cutting of prints*. In this the artificer exerts his skill, not only to keep to the pattern he has before him, drawn upon a block, but by his judgment to improve and finish the design to greater perfection. This is not to be understood to be the case with all cutters, for there are many, who, having a good design well drawn upon the block before them, will, nevertheless, so mangle and deface it by their ill management of the knife, that when it comes to be printed, it has hardly the appearance of the pattern he had carefully delineated before him. However, such hands are not to be rejected, since, in case they are not past improving, they may be employed in some ordinary work, till, by practice and endeavours, they become more proficient, and able to perform such works as require a masterly stroke for the best execution. Thus much may suffice relating to the *cutting of prints*, and grounds for the several colours belonging to them. The manner of their working, and the implements they use, being a subject which is not designed to touch upon, we now resume the subject where it broke off, which was in the printer's-room, or the printing-shop. Here the journeyman printer receives the prepared and calendered pieces, for which he has orders to print so many of one, and so many of the other print, distinguished by certain numbers. He spreads it upon an oblong square table, of a considerable thickness, covered on the surface with a swan-skin blanket. Then taking the print in his right hand, and an oval round mallet in his left, he dips the print on the colour, that is spread by a tearing-boy, or girl, with a brush, upon a fine worsted cloth, which is strained with a leather under it to a round hoop-frame, and swims on dissolved gum that is in a shallow tub; and having thus furnished his print with the colour, he lays it on the linen or cotton, and with the mallet gives it two, three, or more knocks, according to the size of the print; then taking it off, he repeats it, by observing the joining both at the ends and sides: one table being done, he removes the printed work from off the table, and thus proceeds with another, till the whole piece is done. If at the same time the second colour is to be grounded-in, he does that before he removes the work from off the table he has printed.

The pieces thus printed and ground, are from the printing-shop conveyed to the copper or boiling-house, where the copper-man, who has the boiling them under his care and management, puts them in a large copper, and boils them with madder, a reddish drug, imported from Holland in large quantities, and of which there is a vast consumption among the callico-printers and dyers, more especially among the scarlet-dyers. Several pieces being tacked together, one end of the first is put over a winch, and whilst the copper is boiling, a man stands and turns the winch, and the copper-man manages the pieces, and keeps them from entangling, spreading them with a stick, in order to take an even colour. After the copper-man finds them sufficiently boiled, and the colour or colours to his liking, the pieces are taken out of that copper, and conveyed to another copper, where they are boiled in water and cow-dung, in order to clean them from all greasiness which might remain in them; they are then, by the gruffers, carried to the river, and, being rinsed and cleaned from all filth and nastiness, are by them spread on the grass to be bleached or whitened, whereby the ground, which, by boiling in the madder, has received a reddish stain, is taken out, and the cloth, except the printed part, restored to its original clear white; then they are taken up, carried to the river, rinsed, and hung upon the poles, to dry; being dry, they are carried to the warehouse, whence they are delivered to the pencilling-shop, where the colours of blue, green and yellow are pencilled-in, upon frames for that purpose, according to the pattern laid before them

This is the method used for the common work, for three of five colours. The chintz, after the black, red, and purple is printed and grounded, are first scalded in a copper with a little madder, and when taken out and rinsed they are hung up to dry; being dry, they are carried to the grounders, to lay on the light-reds in the flowers, with stamps or grounds of various sizes, upon printing-tables spread with blanketting. This being done, and the colour upon the pieces dry, they are carried again to the copper, and boiled, as has been related before.

The colours being pencilled-in, the pieces, when dry, are again carried to the river, and, by the current of the stream, cleaned from all superfluities and colours left upon them; then they are dried, carried into the warehouse, and there folded up, in order to be sent home to the drapers they belong to: such is the management of printing callicoes, cottons, and linens. In the several branches a manufacturer ought to be thoroughly experienced, by study, vigilance, and assiduity; so as to be qualified to inspect, order, and instruct every one of his workmen in their several employments.

The principal secret for carrying on the printing business is that of preparing the colours, which every master studies to bring to as great perfection and beauty as possibly he can. He that has the advantage of producing the best colours, will not fail of encrease of business, and encouragement among the drapers, provided at the same time he can shew a set of good patterns; for one without the other will not be complete.

Before the printing or pencilling of the blue colour was found out, the printers were obliged to dye it; the blues in chintz were dyed in a blue-vat, after the rest of the cloth was covered over with wax, which caused a great deal of trouble, labour and fatigue. The Indians in their chintz are obliged to follow the same way; they, as yet, not being possessed of the secret of printing or penicilling their blues. This has proved of singular advantage; because the callicoes and linens, for common wear, could only admit of black and red; whereas now, by pencilling the blue, and the yellow upon the blue, five colours, namely, black, red, blue, green and yellow, are produced.

PART III.

THE ART OF

PAINTING IN OIL-COLOURS, &c

PAINTING is the art of representing to the eyes, by means of figures and colours, every object in nature that is discernible by the sight; and of sometimes expressing, according to the principles of physiognomy, and by the attitudes of the body, the various emotions of the mind. A smooth surface, by means of lines and colours, may be made to represent objects in a state of projection, and may also represent them in the pleasantest dress, and in a way the most enchanting to the senses. The objects, moreover, which delight us by their animation and colours, and which speak, as it were, to the soul, by portraits the dearest to our hearts, give a taste for innocent delight, and furnish us with elevated sentiments.—Such are the effects of painting, when practised by a genuine artist.

The art of painting, like every other art which boasts of excellence, is extremely difficult of execution. The painter who invents, composes, and colours agreeable to nature, has an eye over every thing in the universe, and rules in an empire which extends over all nations and ages. He can present to us heroic deeds of ancient times, as well as facts of more recent date; forming a supplement to nature, which can only exhibit to our view the representations of present objects.

But a painter, even in this noble sense, is far inferior to himself. He can give sentiments to the spectators such as the scenes themselves could not have done, by fixing the attention to points the most profound and animating. He can select the period most likely to electrify the senses, and by the boldness of his genius can rouse the imagination to sublimity. He can himself be great, and share the poets praises with the immortal Homer.

In laying before the reader an account of this noble art, we shall confine ourselves to the rules which are calculated to initiate him in the practice, that he may conduct his studies with more ease to himself when he arrives at a period requiring higher books*.

Every one who intends to make any progress in painting, ought to be well acquainted with the art of drawing and designing.

He ought to have some tolerable judgment in the choice of such colours as are fittest to paint with in oil, as likewise how to blend and mix them for the several purposes of light and shadow; that variety may be thereby obtained in the colouring of a picture, as well as to procure a lasting freshness. It is the opinion of some artists, that a picture in oil-colours cannot long maintain its primitive beauty and freshness; however, some pictures improve by growing old; for time will wear off that harshness from the carnations, and make them look softer and more natural than at first. Flowers, on the contrary, appear more beautiful, splendid, and pleasing to the eye when fresh painted, than they do when stript of their beautiful colours by time.

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* A useful "*Practical Treatise on Painting in Oil-colours*," was published in 8vo. 1795, by J. White, Fleet-street. *Ed.*

With respect to colours it may be affirmed, that earthy colours are the best for lasting, especially in oil-painting. The principal are white, black, red, yellow, blue and green.

White is the principal colour, and this is white lead, or flake-white; but care must be taken that it is not adulterated with lime, chalk, or other things, which in time change and turn yellow. For black we use sea-coal, ivory-black, and Cologne-earth. For red, vermilion, common English brown-red, and burnt ochre. For yellow, light and dark ochre, and umber. For blue, ultramarine, and verditer. For green, terra-verte, or green-earth, and a mixture of blue and green. All these colours answer well in oil. See, further, the article "Colour-making," Vol I.

Vegetable colours are not fit to be used in oil, for they not only work foul, but prove fading in sun-shine, or the air; but mineral and earth colours will stand both.

From all that has been said it may be seen, that paintings are subject to change; but that time may improve, nay frequently add more beauty to a picture than the artist himself could do: hence the best masters have so blended their colours, that time shall produce the intended effect.

How far laying on the colours several times over may conduce to a picture's duration, is easy to account for; as the stronger and fuller a colour is laid on with the pencil, the more lasting will be the painting. For which end, several masters have laid on their colours to a great thickness, especially in such as require being viewed at a distance. Some of the original paintings of Rembrandt are done in this manner, with great judgment and boldness.

To prepare the colours so as to make them less liable to change, the grinding and mixing them up with clean and sweet nut-oil, instead of linseed-oil, will contribute greatly, especially if mineral colours be employed. The varnishing a picture with a varnish prepared with gum copal and spirit of wine, which, (not like the common varnish of the shops) is not liable to change, preserves the painting in mineral colours, as has been practised among the ancient painters.

Venetian painters who brought colouring to the highest perfection in their time, used for the carnations no more than four capital colours, by judiciously mixing which, they distinguished all sorts of complexions, ages and sexes. They also knew how to heighten the colours, that they should for a long time retain their beauty; particularly *green*, which was not subject to fade as it generally is now.

In the more early times, when painting was yet in its infancy, the figures were not coloured or shaded, but only the out-lines drawn with one single colour; and when they drew or painted, they were wont to write underneath, *the name of the thing*. In process of time the art came to be improved, and several colours to be employed; however, each figure was in one colour only. The imitation of the flesh, veins and arteries; the folds in draperies; the giving the figures more than one colour; and the passions in painting came next to be invented.

In those days the greatest performances were in water-colours, laid on high and glaring. Protogenes, to make his colours lasting, was said to lay them on fourfold, that if by accident or injury of time one layer or two should drop off, another might appear in the room. This was the state of ancient painting: what improvements have been made in it since would carry us too far to relate. We shall only observe that the Flemish painter, John Van Eyck, or John of Bruges, was the first who discovered the way of painting in oil, whereby pictures came to retain their beauty for many ages together.

Mons. Santerre, a modern French painter, is said to have been so great a master as to give his works such an air of freshness, that, after thirty or forty years, they should look as if but newly finished; for which purpose he employed only four or five earthy or mineral colours, by mixing which, he could, though not without some trouble, produce all the variety of colours; he laid them on three or four times, and made use of no lake, or any other colour that he thought would fade and decay.

Perhaps, Le Blon took the hint from Mons. Santerre, when he endeavoured to fix harmony of colours in his paintings, by blending the three principal colours, viz. red, yellow, and blue, so that all visible objects might be represented. Le Blon reduced the harmony of colouring in painting to certain infallible rules; whereas, according to the then practice of painting, colouring was the effect of mere chance or guess-work; painters usually affirming, that there was no certain rules given for mixing colours. Le Blon published, some years ago, an ingenious book on this subject, intitled *Coloritto*, or, the *harmony of colouring*.

By his rules, Le Blon represented any object in its natural colours, by means of three copper-plates, with three principal colours. The plates were chiefly after the mezzotinto manner; but the darker shades, and sometimes the out-lines, where they were to appear very sharp and dark, were done with a common graver. Each plate was not completely engraved, but only contrived to take such a portion of the colour as was necessary, with the other two plates, to blend them together, and render the picture complete.

In painting, light and colour are inseparable, for wherever there is light there is colour. Thus, colouring comprehends two things, the local colour, and the claro-obscuro. The local colour is that which is natural to each object, and which the painter ought to improve by comparison, and know the union, sympathy, and antipathy of them.

The claro-obscuro, or chiaro scuro, is the art of distributing the lights and shadows to advantage, and is the only means to set off the local colours, and the whole composition in a picture. To obtain that art we ought at first setting out, in the exercise of painting, to endeavour to copy after masters celebrated for their excellent colouring. Titian's way of colouring surprises every beholder; not to mention several others, who have excelled in beautiful colouring, and in observing the claro-obscuro in their pieces. Therefore young persons ought to be very careful, at first, to make choice of good performances to copy after, lest, by taking up a bad manner, they get a habit which they never after can get rid of.

Let him by no means neglect, whenever he has an opportunity, to visit the cabinets or apartments of the great, and gather beauties, to employ them as occasion shall require.

How young persons, that are desirous of attaining the knowledge of painting, may proceed in the first beginning of their practice, the following rules, if well observed, will be sufficient to shew. And, because all materials cannot easily be had in country towns as in London, we shall endeavour to give him instructions to provide himself with all things necessary.

How to make Size, and to prime Cloth for painting upon.

TAKE glue, and let it for some time soak in fair water; then boil it in a pipkin till it is quite dissolved, and of a moderate thickness for a good size. With this, after you have strained your cloth or canvas on a frame, and rubbed it smooth with a sleek-stone, you size it over: if you add a little honey to your size it will keep it from cracking. When your first priming is dry, then whiten it over with whiting and size, and last of all, when thoroughly dry, paint it all over with a greyish colour of white-lead, and a little black, ground with linseed-oil, and laid on the cloth smooth and even. This being dry, you may then begin to draw on it the design you intend to paint.

Linseed-oil is the best for pictures, except it be for flesh-colour, white drapery, linen or lace, for which nut-oil is much preferable; the linseed-oil being apt to turn yellow. Most painters make use of drying oil, with which they mix the linseed oil to temper their colours; others, instead of drying oil, make use of oil of turpentine, which causes indeed the colours to dry quick, but the beauty of them will in time fade away.

How to paint the Face.

HAVING first made a rough sketch upon your primed cloth with white chalk, you draw the strokes for your out-line carefully over again with your hair-pencil, in any dark or brown-red colour; then lay your colours you intend to use upon your palette, one by one, round about towards the edge of it. (*See plate* III. *fig.* 1.) First a pretty large quantity of *white*, then a little *vermilion or red-lead*, and a little *lake*; next place your *brown colours*, then your *blues*, and *yellows*, and *last of all* a little *black*. In doing this, observe not to crowd the palette with too many colours, but make choice only of such as are not subject to change; these are principally earthy colours. Your endeavour must be to imitate Le Blon, spoken of before, in mixing, tempering, and blending all the varieties of colours of only *three or four principal ones*: but this is an art sooner acquired by application and practice than by demonstration and rules. If you intend your picture after the life, that is to say, a portrait, and have drawn the outline, in the manner as has been observed before, you place the person in a good light, so as to make a gentle reflection; for a glaring light makes hard and unpleasant shadows. The north light, if it can be had, or north-east, will answer the purpose better than any other. Let it be open, without any reflection of trees or walls, and likewise high, that your shadows may fall downwards. Place yourself so before your frame that the light may strike from your left hand to your right. Have a tin box, with several divisions, one to hold your pencils, another your colours tied up in bladders, a third to hold linseed oil, and one empty to discharge, or clear your pencil, by dipping it first in the oil, and then pressing the colour out of it between your finger and the edge of the box. This settled, and the person to be drawn placed in the proper attitude, according to the first design, examine whether you can make any amendment in the out-line, and after you have satisfied yourself on that account, then observe the complexion of the person; if, of a fair one, then mix on your palette some red lead, lake, and white, tempering them to the colour of the cheeks, lips, &c. but faintly, remembering you may add when you please, and make your colour deeper or stronger; but you will find it a hard matter, when too deep, to rectify it without spoiling the picture. You now must watch and catch the graces that appear in the countenance. In smiling, you must observe how the eye changes and contracts, how the mouth extends a little upwards, and how the cheeks raise themselves towards the eyes. Under and about the eyes you will perceive a delicate redness, and underneath them somewhat inclining to purple; this you will most frequently discover in fair and beautiful faces, and it must be carefully observed. The manner of working, blending, and sweetening your colours one into another, must be the fruit of industry and practice; just as you find your inclination is bent to follow the method of one good painter who has made himself admirable in your eye by his performances. To prescribe certain rules is impossible, above those of your natural capacity, and applicable experience. This first sitting, or dead colouring, you perform with bold, but judicious strokes; and though near at hand they seem rough, uneven, and unpleasant, yet, at some distance, they will have the desired effect when you introduce the second and third sitting, to view it nearer: for though your work be ever so rough at first, if but the likeness is there, it will be in your power to sweeten and close it as highly as you please.

Having thus far advanced in painting the portrait with the complexion of the face, you must now bring in those blue tints about the corners and balls of the eyes and temples; these you must work exceedingly sweet and faint, and, by degrees, bring in your shadow and deepening, according as your light falls with either hard or gentle touches; and be sure to make out the strong shadows in the dark side of the face, under the nose, chin, and eye-brows, and bring the work in an equal roundness; and by visiting all the parts of the face, as it were at random, you will better observe the likeness, roundness, and colouring; and, by amending places you find defective, you will render your work complete in the end.

To

To paint the Hair.

DISPOSE the hair in such forms and turnings as best become the picture, and answer the likeness or fashion of the person. For black hair, take lamp-black, or Cologne-earth; and, where it is to be lighter, add to it some umber, or red-lead, or temper your colours according to that of the hair, giving it an easy turn and graceful display about the face, neck, and shoulders.

How to proceed at the second Sitting.

THE second sitting will require more time, but that will be according as you intend to bestow more or less pains upon your work.

The person being placed in the same attitude as at first sitting, you now more narrowly examine the features and likeness of the picture, and whether you have in your first performance come up to the true resemblance of the original before you; you then make use of the same colours, in the same places as you did before, working, blending, and sweetening them one into another, so as none of your work be left with an hard edge, or in patch-work, observing all the lights and shadows, and by little and little to work them over and in one another: and, after having bestowed an hour or two, you may then lay on the ground behind your picture, making the strongest shade to fall on the side where the light falls on the person drawn. This colour is commonly made of Cologne-earth, brown ochre, and yellow ochre, with a little indigo to make it of a greenish hue.

Of

Of painting the Drapery.

THE back ground being laid on and dry, you then sketch out the drapery, and finish the hair whilst the person is before you, who by this time perhaps will be as much tired of being confined, as you by your employment. Being gone, you must spend some time by yourself in working and sweetening your colours to perfection; then lay on the colour for the linen or lace, and finish the drapery according to the colour of the stuff fixed upon, in the same form and fold you drew them in your first design. The colours for drapery or apparel must be mixed and tempered to what is laid before you. But to give novices in the art of painting some instruction on this head, I shall endeavour, by the following precepts, to point out the method.

For linen, as headcloths, ruffles, necklaces, &c. mix charcoal-black, and flake-white, with clear oil of nuts, and by adding more or less, either of the one or the other colour, you may make your shadows either lighter or darker. In painting lace or cambric, you add a little ultramarine or smalt.

For Velvet.

FOR black velvet take lamp-black and verdigrise to lay on the first ground; which being dry, take ivory-black and verdigrise; then heighten it with a little white, and shadow it with a mixture of lamp-black.

For green velvet take lamp-black and white; work it with strong lights and shadows upon your cloth or picture, and, when dry, draw it over with verdigrise, tempered with a little pink-yellow. If it is to be a sea-green, then do it without pink: if a grass-green, add a little masticot to the verdigrise.

For red velvet, take vermilion, and shadow it with Spanish brown; for the deepest shadows, take sea-coal-black, and Spanish brown, together with some of the vermilion; when dry, glaze it over with lake.

For crimson or carnation velvet, take more or less white to the vermilion, and proceed as before.

For blue velvet, temper smalt and white with oil of nuts.

For a yellow velvet, take masticot and yellow ochre, and for the deepest shade, use umber.

For a tawny velvet, take Spanish brown, white, and lamp-black, with a little verdigrise; give it a strong light and deep shade, and, when dry, glaze it over with lake and a little red-lead.

For purple velvet, take oil, smalt, and lake, of each an equal quantity; temper them together with white, according to your discretion.

For ash-coloured velvet, take charcoal-black and white, and, tempering them like to a dark russet, it will be of an ash-colour.

For hair-coloured velvet, take umber ground by itself, with oil; and where the gloss is brightest, mix some white; and where the folds are, lighten or darken them with white and umber. In all velvets, you must work your colours at first sad and obscure, and then give them a sudden brightness.

For Satins.

For black satins, take lamp-black; grind it with oil, and temper it with white; and, where you will have it shine most, mix it with a little lake.

For white satins, take flake-white; grind it, by itself with oil of nuts, and temper it with ivory-black, lighter or darker at discretion.

For green satin, take verdigrise; mix with it some white; and in the brightest lights, add some pink to it.

For yellow satin, take masticot, yellow ochre, and umber; in the brightest places use masticot alone; in light shadows use ochre, and in the darkest use umber. Blend them into one another as you think most proper to your end.

Blue satin you do with smalt and white.

For the purple satin, you use smalt and white, glazing it over, when dry, with lake.

For orange tawny satin, take red-lead and lake; where brightest, use red-lead; and where dark, add more lake.

For red satin, grind Spanish brown by itself; mix it with vermilion, and, where brightest, mix your vermilion with white.

For hair-coloured satin, mix umber and white, and with these make your shadows; for the deepest places, add some sea-coal-black.

In painting of taffeties you proceed in the same manner as with painting of satins, only laying on your colours and shadows one by one, and blending them together afterwards.

In painting of cloth you proceed as with satins, only you do not give it such strong lights.

For a buff-colour, you take ochre and white, and where you would have it darkest, mix it with a little umber; and when you have wrought it all over, take a broad pencil, and glaze it with a little umber and sea-coal.

For yellow leather, take masticot and yellow ochre; shade it with ochre.

Metals.

For iron, take lamp-black, well tempered with white and a little blue.

For silver, take charcoal-black and white, and with these temper your lights and shades.

For gold, take lake, umber, red-lead, and masticot;

these are the colours for gold: you first lay on the ground with red-lead and a little pink; the deepest shade you do with umber, and the light with masticot.

For pearls, you temper charcoal and white, and having brought them to their shape and form, give it a speck with white only.

Precious stones you imitate by their natural colours, and finish them diamond-cut with light and shadows; then, with transparent-colours, varnish them over, to give them a shining gloss.

Fire you imitate by tempering vermilion and red-lead, for the red flame; for the blue flame, smalt and white; for the yellow, masticot blended with vermilion.

The Art of painting Mezzotinto Prints with Oil-colours.

PASTE your print on a piece of clean, white, crown glass, which must be of the same dimension with the print; this you do in the following manner: first, take the mezzotinto print, and draw it through clean water; repeat this six or eight times, once every hour; then lay it between some moistened printing-paper, and let it there remain all night: the next day you may set your glass before the fire, and, when it is warm, take some Strasburg-turpentine in a tea-cup, or a pipkin, and warm it over a clear fire; then take a large brush of hog's hair, and dipping it into the turpentine, spread it smooth and even upon the glass: then, the print being thoroughly soaked, you take it out from between the paper, and lay it gently on the glass, beginning at one end, and proceeding gradually to press it gently down; and thus you go on till the whole print lies close, and you perceive no wind-bubbles between the paper and the glass. This being done, with your fingers roll and rub off all the paper, till you see no remains of it, but only the print upon the glass: thus the most difficult task of your work is done. If your print is on a stubborn paper, then roll it up, tie it round with thread, and boil it in fair water, and that will make it fit for peeling. When your glass with the impression on it is thoroughly dry, have your oil-colours, of all the different sorts that painters use, placed on a palette, and paint the several parts with such as are suitable to them, on the *back* of the print, which will guide you by the out-line, where to break off one, and to begin another; the shadows of the print will make the shadow of your colour. But if you choose to have one deeper shadow added to what is already upon the glass, then let them be laid on first, and the lighter colour after, which you may blend together, so as to imitate a real painting. Whatever colours you lay on, let them be strong-bodied, that they may make the better appearance on the face of the glass.

The colours used for this art are these, mixed and tempered with linseed, and a little drying-oil:

For the carnation, or flesh-colour of a fair complexion, you must temper flake-white with a little vermilion, and but a very small matter of fine lake; for the lips, a little more vermilion and lake: you mix this carnation with nut-oil.

For a brown complexion, make use of burnt ochre and white: if a tawny-moor, you temper Cologne-earth with a little burnt ochre, and a very little white.

The hair is generally laid on with a mixture of umber, and a little black and white. If it turns upon the yellowish, then add to this a little ochre, with a small matter of vermilion; thus you may temper it deeper or lighter, as you would have it. For flaxen hair, use flake-white, ochre, and a small quantity of Cologne-earth.

The colours for garments are manifold. 1. For blue garments, you temper the best smalt with flake-white. 2. For grass-green, take verdigrise and pink-yellow. 3. A sea-green is made with green-verditer, pink and flake-white. 4. A crimson is a mixture of vermilion, lake and white. 5. A scarlet you lay on with vermilion only. 6. A cherry is tempered with vermilion and white. 7. For yellow, mix either yellow orpiment, or masticot; if paler, add flake-white, or white-lead. There are several other yellow colours to be had at the colour-shops. 8. For an orange-colour, mix orpiment, and a little vermilion. 9. For a purple, temper smalt, lake and white. 10. For a violet, smalt and lake. 11. A straw-colour is made of flake-white, yellow ochre, and a very little umber. 12. Ash-colour is a mixture of black and white. 13. Chesnut-colour is mixed of umber, lake and white. 14. Angels' wings, or dove-colour, is tempered with white, a little lake, and some smalt.

For trees, you temper the following colours:

1. The bodies of trees are commonly painted with pink, yellow, white, yellow ochre, and some small matter of black. 2. For the leaves that are near in sight, take verdigrise and pink; or if you want to have them of a darker colour, mix indigo with pink. 3. The leaves of trees which are more distant, must be done with green verditer, pink and white.

The colours you lay on behind the picture you must choose according to the colour of the hair: if the hair is light, it requires a dark ground; if the hair is dark, or black, it must have a light ground. The colours for the dark ground are made of umber, white and black; and a light ground is composed of umber and white.

For the fore-ground in landscapes you temper ochre, pink and white, with a small matter of verditer. Country-cottages, that are seen at a distance are laid on with white, yellow ochre and smalt: the same colour likewise serves for stone buildings. Brick houses, or walls, are done with yellow burnt ochre and white, if they are at a great distance; but if near, then take Indian red, and a little white.

Sky-colours are prepared of smalt and white, for the highest sky; for the lower, more white is added; and yellow tempered with a small matter of vermilion, for the lowermost of all. Observe, that in all your sky-blues and whites, you temper your colours with oil of nuts.

To work in Crayons.

THERE are several methods used in the execution of this art; some practitioners follow the rule of a certain French artist, whose custom was, to reduce the several colours he intended to make use of, into powder, and place them in little boxes before him upon a table, then with stubbed pencils, the ends filled with cotton, he rubbed them in on fine white medium, or crown-paper. The finishing strokes of the deep shadows he reserved for sharp-pointed red and black chalk. This manner of painting in crayons is neat, but not lasting; because the colours, not being bound, are apt to fall off, and cause the work to be defective.

Others do it with crayons of the length of one's finger, composed of several colours, mixt and ground together, of a good consistence, and rolled up: when dry, they are fit for use. Most practitioners work with them on blue paper, pasted on cloth, and strained. They rub in the colours with stubbed pencils, or with a twisted piece of paper, or a little bit of spunge put in a quill, or with a leathern stump, or with their finger's end.

The last and best way is, in the opinion of many, this; you colour the paper on which you intend to draw your picture, with carnation or flesh-colour, as near the complexion of the person who is to be drawn, as possible. You may at the same time colour other papers with different complexions, and put them by against you shall have occasion to use them: in doing which you use a moist spunge; your colour must be bound either with gum-arabic, or size, so as to prevent its coming off by rubbing: this being done, and the carnation dry, you draw the out-lines faintly with red chalk; then, with your several crayons, you rub in the colours, and with the end of your finger, you blend one into another; and, as it is impossible to sharpen your crayons to such a point as is needful, you must finish and close your work with red chalk, and black chalk, which with your penknife you may sharpen to a very small point.

There are various ways of making crayons; some make use of milk, beer, ale, or new wort, to bind the colours; others use rotten size: but the best way is to do them in the manner following: Suppose you want crayons for a brown complexion, grind flake-white, red-lead or vermilion, English-ochre, and a little pink: to them add a small quantity of plaster of Paris; mix and incorporate it with the other colours, thick and stiff, like moist clay; then take it off the stone, and roll it between the palms of your hands as long as you think fit, and lay them to dry, in a shady place, in the air, but not in the sun, nor before a fire.

In this manner mix and temper all your other colours; ~~but observe~~ that some colours require more, others less, of the plaster of Paris; some none at all. They are such as you will be obliged to mix with other colours, viz. the crimson, where you will find it necessary to mix a little vermilion along with the lake, in order to work it with pleasure.

In this manner you may paint all manner of landscapes, with beautiful greens, and all other colours requisite for rocks, water, sky, &c. remembering when you mix, or temper fast and firm colours, as umber, indigo, ochre, or the like, you take less plaster of Paris; but where the colours are loose and sandy, you must bind them by adding more of it: practice will instruct how to proceed with discretion, better than can be done by the pen.

*To restore decayed Paintings**.

THE works of the greatest masters are often in danger of being lost by the decay of the canvas upon which they are drawn; a method of remedying this inconvenience, therefore, cannot but be agreeable to all true lovers of painting.

Let the decayed picture be well cleaned, and spread with its face downwards upon a smooth table; the back of it is then to be well moistened with boiling water, and, when the canvas is sufficiently softened, the picture must be turned up, well stretched out, and nailed down to the table all round the edges. The painting is then to be covered over with strong glue very hot, and a linen-cloth, half-worn, of the same size as the picture, to be spread upon it, and nailed down round the border: it is then to be exposed to the sun, to be dried as soon as possible. When it is dried, it is to be detached from the table, and nailed down again with the back of the painting uppermost. A little raised border of wax is made all round the edges, and the table being placed exactly level, a mixture of aqua-fortis and water is poured upon it; if this mixture be too strong, it will burn the painting, care must therefore be taken to prevent this, by dipping your finger in the mixture before you use it; and if your finger does not turn yellow immediately, it is a sign that the liquors are mixed in a due proportion. This mixture remains upon the canvas till the texture is quite dissolved, and the threads rotted; the liquor is then poured off, and the threads of the canvas are easily taken off with a spatula, and the crust of painting will remain alone, glued with its face downwards to the linen-cloth before-mentioned. The crust is then to be washed and cleaned with pure water, afterwards wiped with a fine soft spunge, and permitted to stand till it be quite dry.

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* This receipt was communicated to the public, in the Gentleman's Magazine, for the year 1756.

It is then to be covered with glue, wherein a little brandy is to be mixed, to make it stronger: upon this glue a new canvas is immediately superinduced, spread smooth, and well pressed, so that it may stick in every part. The best way of pressing it is with plates of lead, or slabs of polished marble, care being taken to wipe the new canvas from time to time, to prevent its sticking to the plates, by means of the glue which oozes through it. All that now remains to be done is, to take away the linen-cloth and glue which cover the face of the painting. As soon, therefore, as the last glueing is dry, the whole is to be detached from the table, and the linen-cloth turned up, by moistening it with the mixture of aqua-fortis, and common water; its texture will soon be destroyed, and it may be taken away; and then, the glue may be easily moved by means of hot water. Thus is the painting transferred, entire and perfect, to a new canvas.

When paintings are upon wood, the wood must be pared till it be very thin; and the mixture of aqua-fortis and common-water being poured upon what remains, will soon dissolve its texture, and render it easy to be taken away.

Approved Methods of Painting in Water-colours.

THERE are two ways of painting in water; one by mixing white with your colours, and laying on a thick body; the other, by washing your paper, or vellum, with a thin water tinctured with colour. The first method is thus performed: when you have a drawing finished in out-lines, you lay in your colours mixt with white, in such a medium as to be about the middle colour between your highest lights and deepest shadows. The distances must be done first, because the out-lines of the parts more forward may be worked over the more distant and first finished parts when you have laid your ground-shadow first. Use the same colours you have laid on, only with less white in them, till you come to your deepest shadows, wherein is no white at all. But it is to be remarked, that very strong shadows are required only in the front objects of the picture, and that the deeper shadows of the fine colours must be mixed with black or brown, to give them their natural obscurity. When the dark shadows are finished, you may begin to heighten the lights, by adding white to the colours with which you laid in the different parts of your picture; observing always, that as objects are little shadowed, they must be little or nothing heightened, when very distant; but front figures may be heightened very much; yet we should avoid using pure white, in the heightening of an object, unless it be of a white colour, or has a polished surface, or be some other body that reflects the light very strong.

When all the particular parts of the picture are finished separately, the whole is to be carefully surveyed and considered, to see that there is harmony throughout; for, if distances nearest to the foreground are too faint, they will seem to be farther off than their perspective proportions will allow; or if your greatest distances are expressed too strong and distinct, they will be brought too near; so that after finishing the parts, there generally wants some amendment in the whole.

In a piece of painting especial care should be taken that there be no very sharp, or hard lines, or any sudden lights immediately bordering on dark shadows. On the contrary, the out-lines of objects should be so broken into the grounds behind them, as not to be precisely traced; and many painters have harmonized all their colours, by never introducing a direct red, blue, yellow, or hardly any other gay colour, without some little mixture.

This method of using water-colours is called painting; the other is called washing, or staining*; and the subject may be either a drawing, or a print.

To make an intire drawing in the thin, or washing way, it must first be drawn in out-lines, and then you may proceed to finish it with different colours in its different parts, as the nature of the thing requires, beginning to wash with water thinly tinctured with colour, at first, and gradually proceeding to use it more strong in your shadows; employing no white at all throughout your work, but carefully leaving the white of your paper in the high lights of white objects; and very thinly washing the lights in coloured bodies. You are to observe, that this method is no more than making a drawing in Indian ink, only instead of making it all black, you use fine prepared colours in the different parts of your picture.

Prints may be coloured this way, without white intermixed. In order to procure colours that will be exceedingly fine, and run very smooth in this way of washing—mix a little gummed colour in a large shell, work it well with your finger, then thin it with water, and let it settle a little, and by pouring a little of the top of it into another clean shell, you will procure a fine free-working colour, which you may make as light as you please by the addition of water †. If a colour does not spread itself freely, by reason of any greasiness on your paper, if you touch your pencil ever so little in ox-gall, it will make your colours run free. Always observe in these first and lightest colours

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[*] The above two methods are styled, by the artists of the present day, *body-colour* and *tinted. Ed.*

[†] Cakes of colours, ground up with the due proportion of gum required (for each sort of colour works better with a peculiar portion of gum) may be had at the shops. They are used precisely like Indian ink. *Ed.*

to use a large pencil, in order to fill up the space you have to cover with all convenient expedition; for if you are slow, and let your colour dry in parts, and touch again over the edges, your colours will be blotchy and streaky.

Paper, for drawing on, in this way, ought to be neither over nor under gummed; that which is too much gummed, or sized in the making, is so hard and close, it will not take in the colours at all, and what is laid on at first is apt to wash off again in the second shadowing; and paper not sized hath a contrary inconveniency, for the colours are apt to run through it, and spread beyond your design on the out-side. A proper paper may be chosen by touching it with your tongue; an ungummed paper will stick very close to the top of your tongue; an over-gummed paper will hardly stick at all, by which a proper medium may be found by that which only sticks a little to the tongue. It is of small import whether your paper be white or not, provided it be of an even clear grain and surface. A cast on the yellow, or cream, will not hurt the drawing when finished. If a print that you would colour be on a loose ungummed paper, it may be prepared for colouring by washing it over, once or more, as it may require, with a thin paste made of wheat-flour, boiled in water, and letting it dry on between each washing *.

A Method of making Pictures of Birds with their natural Feathers.

First take a thin board, or pannel of deal, or wainscot, well seasoned, that it may not shrink; then smoothly paste on it white paper, and let it dry; and if the wood cast its colour through, you may paste on a second paper, and it will be whiter: let the second paper dry; then get ready any bird that you would represent, and draw it as exact as may be on your papered pannel, of its natural size (middle-sized birds are the best for this work;) then paint what ground-work, or tree, or other thing you design to set your bird on, together with the bill and legs of the bird *in water-colours*, leaving the bird to be covered with its own natural feathers. You must first prepare the part to be feathered, by laying on pretty thick gum arabic water, with a large hair pencil; then lay the pannel flat, and let it dry hard, and when dry, cover it with your gum-water a second time, and let it dry, and then a third, in case you do not find it lie with a good body on the paper; (the thickness of a shilling, when dried hard, is sufficient). When your piece is thus prepared, take the feathers off from your bird, beginning at the tail and points of the wing, and working upwards to the head, observing to cover that part of your draught with the feather that you take from the same part in your bird, letting them fall one over another in their natural order. You must prepare your feathers by cutting off the downy part that is about their bottoms, and the larger feathers must have the insides of their shafts shaved off, to make them lie flat; the quills of the wings must have their inner webs clipped off, that, in laying them, the gum may hold them by their shafts. When you begin to lay them, take a pair of steel pliers to hold the feathers in, and have some gum-water, not too thin, and a large pencil ready to moisten the gummed ground-work by little and little as you work it; then lay your feathers on the moistened parts, which must not be waterish, but something tacky or clammy, to hold the feathers. You should prepare a parcel of small leaden weights, in the form of sugar-loaves, which you may cast in sand, by first making holes in its surface with a pointed stick: these weights will be necessary to set on the feathers you have newly laid on, to hold them to the gum, till they are dry and fixed; but you must be cautious lest the gum come through the feathers, for it not only smears them, but sticks to the bottoms of the weights, and will be apt to pull off the feathers with the weights, which will disorder your work. When you have wholly covered your bird with feathers, you must, with a little thick gum, stick on a piece of paper, cut round, of the bigness, and in the place of, the eye, which you must colour like the eye of the bird; when the whole is dry, dress the feathers round the out-line that may chance to stare a little, and rectify what may be mended in any other part; then lay a clean sheet of paper on it, and on that a heavy book, or some such thing, to press it; after which, it may be preserved in a frame covered with a glass.

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* Drawing paper is now wretchedly made; which is said to be owing to *cotton-rags* being mixed with *linen*, since the discovery of bleaching printed calico, after the method of Berthollet. *Ed.*

Directions for taking the Figure of Butterflies on thin gummed Paper; by way of Embellishment.

TAKE butterflies, or field-moths (either those catched abroad, or such as are taken in caterpillars and nursed in the house till they be flies) clip off their wings very close to their bodies, and lay them on clean paper, in the form of a butterfly when flying: then have ready prepared gum arabic, that hath been sometime dissolved in water, and is pretty thick (if you put a drop of ox-gall into a spoonful of this, it will be better for the use;) temper them well with your finger, and spread a little of it on a piece of thin white paper, big enough to take both sides of your fly; when it begins to be clammy under your finger, and the paper is in proper order to take the feathers from the wings of the fly, then lay the gummed side on the wings; and it will take them up; then double your paper so as to have all the wings between the paper; then lay it on a table, pressing it close with your fingers, and you may rub it gently with some smooth hard thing; then open the paper, and take out the wings, which will come forth transparent; the down of the upper and under side of the wings sticking to the gummed paper, form a just likeness of both sides of the wings in their natural shapes and colours. The nicety of taking off flies depends on a just degree of moisture of the gummed paper; for if it be too wet, all will be blotted and confused; and if too dry, your paper will stick so fast together that it will be torn in the separation. When you have opened your gummed paper, and they are dry, you must draw the bodies from the natural ones, and paint them in water-colours; you must take a paper that will bear ink very well for this use, for a sinking paper will separate with the wet, and spoil all.

PART IV.

RULES FOR FINDING
THE
NATURAL SHADOWS OF THE SUN,
LAMP, CANDLE, &c.

THE ancients have related of painting, that the origin, or first discovery, was accidentally owing to shadow: by time, the improvements of shadow has rendered it complete, and brought it to that perfection in which we now behold it. It is light and shadow which strikes the eye with admiration, and gives life and beauty to a picture, even in pieces that have not the advantage of colours, but are merely the product of a painter's skill, displaying light and shadow, by painting grey in grey, or, as artists term it, in *claro-obscuro.* Pieces in miniature, though shaded only with Indian ink, are by some curious hands done to admiration; as are likewise some drawn with only a black-lead pencil. This art is by the Europeans brought to great perfection by demonstrable rules; so that any one who is intent on making some proficiency in drawing, may with pains attain to the knowledge of painting.

The Chinese, and other eastern nations, though people of great ingenuity and artful invention, are yet much at a loss with respect to light and shadow; and though they are very expert in carving and modeling, their pictures, for want of shadow and perspective, are far from being perfect.

It is not my intention to enlarge in this introduction, but proceed in giving the necessary rules for displaying light and shadow, by a method plain, easy, and intelligible. I have omitted, in a great measure, such unnecessary rules as might render the acquisition intricate, and the pursuit discouraging to young beginners; and I have rendered it as easy and intelligible as the nature of it will admit.

By a natural shadow we understand a diminution of light, caused by the interposition of some body which is not transparent, which renders, upon the plane, the form and figure of an object, according to the different sorts of lights: the sun gives it of one fashion; the torch, lamp, and candle, of another. The sun's shadow is always parallel to the object; that of the torch is given by rays issuing from the centre, which cause the shadow to be larger than the body, and encrease or diminish according as it is removed. The shadow caused by the day not having strength sufficient to frame the figure, renders only a confused darkness from the object; this having no rule, every one gives the shadow according to his discretion.

To find the shadow, we must suppose two things, viz. the light and the body: the obstruction of the light gives shape and figure. To comprehend this we must take notice of two points, the one relating to the foot of the light (which ought always to be taken on the plane where the object stands) and the other to the torch, or any other lightened matter: the rule for the sun and the torch, &c. being general, with this difference, that the shadow of the sun is given by parallels, as has been said, and that of the torch or lamp by the central rays of the flame. For example: (*Plate* IV. *fig.* 1.) if by the sun we take the shadow of a cube A, we must, from the sun's height B, draw a perpendicular line to touch the angle of the plane C D; then, from the corners E E, draw parallels to this: and to find the end of the shadow, we must draw a line from the sun B, passing the angle of the cube at F, which will dissect the line C D in G; then drawing a parallel to that by the angle H, it will divide the line E at the point I, which will give the end of the shadow of the cube, drawing the two points I and G together.

Thus by determining the place of the sun, and the point underneath; to draw the lines of an angle, and making other lines parallel, you will have the shade cast before, or on any other side, as you may see by the figures 1, 2.

With respect to the shadow of a cube from a torch (*See fig.* 3, *plate* IV,) we must from the point O, the foot of the light, draw rays by all the angles of the plane of the cube OD, OE, OF, OG; then from the flame of the torch draw other oblique lines by the elevated angles, till they divide the lines below from the point O; and by joining the points I K with a right line, we shall have the shadow of the cube.

The sun never standing still, all elevations of the same height, though distanced from one another, give an equal shadow, according as the sun advances or retires: wherefore, if we intend to cause a shadow of some object or other, we must determine the place of the sun and the point under it, and draw from thence the two lines which deform the shadow, as here the wall A, *fig.* 4, *plate* IV, giveth the point of its shadow in B; and if from the point B you draw to the point of light C, the line BC shall be the shadow of the wall D, as it is of A, and of all that shall be in the same line to the point of light C. But if the light come from the bottom, or from before, we must come lower or more forward with the point under the sun, and draw lines from the one and the other by the angle A to the point of sight M, which will determine the shadow.

If an object is square, then draw from the point A, *fig.* 5, *plate* IV, under the sun, parallel lines from the angles of the plane, as AD, CE; then from the centre of the sun B draw a line to the angle the farthest remote, as at G, which will divide the line A at the point D; draw a parallel to this at the other angle, which will divide the line A in I. From the point D and I, draw lines to the point of sight F, which will determine the length of the shadow.

If it be a round, we must elevate perpendiculars from the foot as from UN, *fig.* 6, *plate* IV, which is the middle, and RP the side; then from the centre of the sun, passing the upper part of the round at N, draw a line, till it divides the parallel at the point O, which determines the length of the shadow: the empty part is found after the same manner, by drawing parallels to NO from the upper part; and one from the point P.

The shadow of a bowl or globe, *fig.* 7, *plate* IV. is found by dropping perpendiculars from both its sides, whereby we are to frame the plane, to fix the line from the sun by a tangent, till it divide the line R at the point T; likewise another, parallel to that at Y, to divide the same line R. The distance between T and V will be the compass of the shadow.

But to find the shadow of the board I, draw the perpendicular M, which will divide the ray NO; then drawing a line (from under the sun) MP, and another from the elevated board I, it will divide MP, and give the dimensions of the shadow.

To find the shadows of objects against the wall, we must from the foot of the light Q, *fig*. 8, *plate* IV, and from the centre of the light P, draw rays, which pass the corners of the plane of the object R; but because they meet with the bottom of the wall T, we must, at the meeting of the angle S, elevate all those lines: then draw, from the centre of the light, other lines at the top of the object R, which shall divide the lines of the plane, and mark the place of the shadow upon each of them. Thus by finding out the foot of the light or lamp, one may have the shadows of objects in what place soever they be: to find the shadow of V, the point X is the foot of the light: the piece Y has the point Z; and the piece * the point † for the foot of the light.

To find the shadow of several parallel planes, we must proceed in the following manner, and as it is illustrated in *plate* V. *fig*. 9. The first plane is the ground whereon is placed a chair; the second is the upper part of a table, which is parallel to the plane of the chair, and either above or below the table there may be one, two, or three more of those planes, on which we may find the foot of the light, for to find out the shadows of the objects which shall be there. For example, the foot of the light is the point C, and B the light; from these two points C B we must draw lines below and above the object O, for to have the shadow E upon the table. Now, to have the shadow of the chair A which is upon the ground, we must, upon the same level or ground, find the foot of the light upon the table, which is the point C; to accomplish this, we draw from the point of distance (which is here beyond the length of the paper) a line by the foot of the table; then, from the corner G, drop a perpendicular, which shall divide the line of distance at the point H, by which we must draw H I parallel to the upper part of the table; thus we shall find what we seek for, by drawing from the point of sight K, a ray passing by the centre of the foot of the light C, to the end of the table L: we must from the point L, drop a perpendicular upon H I, which will give the point M; from which we must draw a ray to the point of sight K, and, dropping upon this a perpendicular from the point C, dividing the ray M K, it gives the point N, for the foot of the light. This being found, you proceed in the same manner for the shadow of the chair, and draw lines by all the angles of the plane of the chair; and, from the light B, draw other lines by the upper part of the chair, which divide those of the plane, and mark where the shadow is to go.

The shadow of the sun in all sorts of figures, naked or clothed, is found by the same rule as of all other bodies, namely, by parallels, both under the figure, and those that come from the sun: for example, *see fig.* 10, *plate* V. let the figures be what they will, we must from under its feet A, draw a line to the point of sight B, beyond the margin, upon which you draw perpendiculars from all the points that may help to find the true shadow: from C you let fall a plumb-line, which shall divide at the point D; and from the elbow E, drop one to the point F; another from the hat G, which will give the point H; from all which points you draw parallels to the base. The height of the sun *being fixed upon, we must draw a line, which shall touch* the brim of the hat G, till it divides the point L, which will be the end of the shadow. Then draw a parallel by the lower point C, till it divides the line D, at the point O;

this shall be the shadow of the hand with the staff. To the point E you draw a parallel, which will divide F at the point P, this shall shew the shadow of the elbow; and so of all places, whereby we may mark the extent of the shadow.

As by the torch, or sun, so, in like manner, by a lamp, we may find the shadow of a cube, or any other object; for we must from the foot of the light, which is the point O, *fig.* 11, *plate* V. draw parallels from all the angles of the plane; then from the point C, draw rays to pass the angles of the cube, elevated, or at top, till they divide the parallel lines below, and they will determine the extent of the shadow of the cube.

To find the shadow of an object that has more breadth at top than below, *see fig.* 12, *plate* V. you must make a plane of the top, at its bottom, by dropping perpendiculars: the height of the sun being fixt upon, you drop from its centre a perpendicular, and draw, from all the angles of the plane, parallels to it; then from the sun draw a line passing by the angle D, until it divide the line of the plane thereof at F; after this is done, draw a parallel to it at the angle A, to divide the line B at G, from which, and the point F, you draw lines to the point of sight E; then, from the point H, draw lines to G and I, and you will have the shadow complete. The shadow of the cross is produced after the same manner, *in fig.* 13, *plate* V. and is fully illustrated in the print.

The shadow of a pyramid by a torch, is the same as if it were by the sun; after having made the plane B, C, D, E, *fig.* 14, *plate* V. and drawn two diagonals to find the midst of the plane F, you cause a perpendicular to drop from A, then draw from the four points to the point A, and the pyramid is framed; then, from the foot of the torch F, pass a line through the centre to I, and from the torch-light draw another to pass by the top of the pyramid A, till it meet the line F at the point I, which will be the boundary of the shadow; and by drawing D to I, and Y to I, it will be complete.

How the shadow of a globe or ball is found by the sun, has already been taught; the following is a short instruction how to proceed in finding the shadow by a torch or lamp: First, take the roundness of the ball by a pair of compasses, which is the circle A, through which draw a diameter B C; below the circle, touching it, draw H O a parallel to B C; then from the two ends of the diameter B C, you may drop a perpendicular on each side to the bottom-line, by which you may frame the plane *. After you have drawn from the foot of the light I, lines which touch the plane on one side and the other, one passing the middle of it, which will shew the breadth of the shade, you must draw lines from the light of the lamp, one of which touching the bowl between A and B, divides the line H O, and points out the end of the shadow; and the other from the light of the lamp touching the fore-part of the bowl at C, divides the line H O, shewing the beginning of the shadow. The same rule is to be observed in cups, vials, flaggons, and other round pieces, which have more breadth at top than at bottom.

The shadows of the sun are always cast on one side, for it is impossible they should, at one and the same time, be of one figure towards west, and of another towards east. But a torch, lamp, or candle, will cast their shadows diversely, the one towards east, another west, this north, and that south, according to the position of bodies about them. The foot of the light A, in the floor, serves for a centre, whither all the shadows draw, and the light B, where they must end; by drawing lines, from B, over the heads or tops of the objects, as from B to C; and in like

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* The drawing of a plane in perspective, for a circle, bowl, or other round substance, is done by drawing the compass of it into a square with diagonal lines.

manner to the rest. Those nearest to the central shade have their shadows shorter; and those farther off increase, according to their distance. *See fig.* 1, *plate* VI.

Figure 2, *plate* VI. has not the light in the middle, yet the order of shadow is the same: they all draw to the foot of the light, and are determined by the point of the light, B, at C.

PART V.

OF

WATER-WORKS, AND FOUNTAINS.

THERE is scarce any thing in nature, be it ever so beneficial and serviceable, but what may, by some cause or other, exceed its limits, and derogate from its original good into some destructive evil. What in this sublunary world is of greater service, both to the animal and vegetable creation, than water, whilst kept in its limits and confines? And again, what in nature is more violent, horrible and destructive, whenever it either exceeds its bounds, or is obstructed in its natural course? Since the general deluge, we have had many shocking instances, recorded in history, of towns, cities, and countries swallowed up by inundations; and were it not for making use of artificial contrivances to curb the violence of this element, many more such calamities and disasters would daily happen.—Fields, meadows and lands would be made useless, and turned into lakes, seas, and other standing waters, from which now, by the ingenuity and industry of men, they are securely kept, by dams, sluices, and other contrivances. Arable land, pleasant towns, and flourishing cities have even been gained by similar means.

It is not intended to enlarge on this subject, it being a task that would require a volume of itself; but only to take notice of some of the contrivances of art and ingenuity, whereby water is made a pleasing scene, as exhibited occasionally in pleasure-gardens, squares, feasts, and other places of resort. When first the water, by its natural course, is conveyed through pipes from a high torrent, and thence to stream forth through lesser tubes or pipes, that are hid in various representations of rocks, figures of men and beasts, fish, fowls, &c. such high torrents will afford admirable delight, in cascades, spouts, and in all that art can contrive or invent in water-works. There is no country in the world by nature better situated for an artist to display his genius in water-works than in the parks, gardens, squares, and other places in England, and yet none where it is less encouraged and regarded. This volume might be filled with a description of the most famous and most admired water-works, cascades and fountains, which excite the travellers who visit Italy, France, Spain, and other foreign parts; but, for brevity's sake, we shall only take notice of the surprising curious water-works of the gardens at Versailles in France, which, at an immense expence, are supplied with water from the river Seine near Marly, by a curious engine, that forces water up a high hill into two large basons, and thence, by aqueducts and pipes, to the gardens at Versailles.

Among a vast variety of admirable representations are the grotto, the bason of the crown, the fountain of the pyramid, the cascade of the water-alley, the pavilion-fountain, the water-bower, the theatre, the water-mountain, the bason of Flora, Apollo's bason, the bason of Saturn, the bason of Bacchus, the bason of Latona, the labyrinth, wherein are exhibited the fables of Æsop, and many others, too numerous to be here specified. The principal aim at present is to give the curious reader a few general hints for contriving water-works in miniature, for his own private amusement, or for decorating of buffettes, side-boards, or desserts at grand feasts, and entertainments; and this merely as a specimen for his improvement. Such alterations as he shall think proper, may be done according to the conveniency and situation of the place in which they are to be exhibited.

To force Water by Descent, so as to stream through various kinds of Figures in a little Fountain.

Let A B, *plate* VII, *fig.* 1. be a cistern placed above the ceiling of the hall or place where the fountain is to stand, either near the wall of a side-board, or over a table designed for a dessert; C a bason, decorated round the rim with shells, standing on a reservoir D, into which the water empties itself, and is from thence, by a private pipe, let out into the yard; E a palm-tree, which reaches from the bason up to the ceiling, inclosing a pipe, whereby the water is conveyed from the cistern A B to the bason C; F a stopple, to keep the water in, or to let it out of the cistern. The bason C has a close covering, which you may decorate with little hollow figures of silver, copper, brass, or else with porcelain figures, to discharge little streams from their mouth, nostrils, bill, or whatever may have an opening for that purpose. You may, for want of them, make use of figures made of wood, or formed of wax, or other materials, painted over, having small pipes concealed within them: these figures may be made in imitation of men, beasts, birds, fishes, &c. The palm-tree may discharge (if made of tin) droppings from the ends of the leaves: it may be represented standing on a little island, with some land-animals spouting water. The rest of the surface, painted in imitation of water, may be garnished with swans, ducks, dolphins, &c. Having thus completed your design, you may, by turning the cock, or pulling the stopple out of the cistern, display your art to the admiration of the spectators; or put a stop to it when you please, by closing the vent-hole.

A Fountain of a different contrivance, for a Dessert after Dinner.

Cause a strait round barrel A, *fig.* 2, *plate* VII. to be made of tin, brass, or copper, of what length and dimension you please; fit a round board D to the inside, so as it may with ease slip up and down, coat the rim round with leather, to keep the water above board; underneath it fasten, to the middle, a pliable steel spiral spring G, by which the board may be forced from the bottom to the top of the barrel. Fasten the other end to the bottom B, and fix to the board D, close to the centre of the spring, a cord H, which reaching down below the middle of the bottom of the barrel through a little hole, you may thereby pull down the board D, in order to empty the bason when full. The conveyance of the water into the bason C, and into the figures which are to send it forth in little streams, must be thus performed: the bason, which may be of what bigness you please, yet proportionable to the place where the entertainment is to be, must have a flat or a convex cover, on which you place such figures as have been taken notice of in the foregoing direction; at the bottom of the bason let there be a round opening E, close to the middle of the top of the barrel; at one end of the cover must be a hole F, which you may open and close at pleasure: this machine must be fixed, so that the top of the barrel may be level with the table. Somebody pulls down the board by the string H, while another fills the barrel through the hole F: this done, stop the hole, then the spring will force the water by means of the board into the bason, and from thence into the fountain-figures; the bason being full, open the hole F, and pulling down the board with the spring, all the water will empty itself into the barrel again; then closing the hole F, and letting loose the spring, the fountain will play as before.

A is the barrel; B the bottom of the barrel; C the bason; D the round board; E the opening by which the water enters in, and empties itself out of, the bason into the barrel; F the hole in the cover of the bason; G the spiral spring; H the string fastened to the board D, by which it is pulled down.

To force Water into little Streams, by Compression.

Cause a barrel, *plate* VII, *fig.* 3, to be made of copper, close at bottom, of what height you please; fit a plug of pretty hard and heavy wood so as to slip up and down with ease, the sides of this plug to be covered round with leather; bore several holes through, towards the middle, over which fasten hollow figures of men, or of fish, birds, &c. having small pipes that may spin little streams from their mouth, bill, &c. Conveyances may also be made to the figures round the bottom of the barrel or cylinder. Fill the barrel with water, and put the wooden plug on the surface; the pressure will cause the water to spin from the little figures, and from the figures at the bottom of the barrel.

A the barrel, B the plug, C the figure of Neptune on the plug; D D the figures at the bottom of the barrel.

An Experiment of forcing Water by Air compressed.

Have a pretty large pot or vessel, square or round, close covered, in the side of the upper part whereof fix a clack of leather and wood, with a piece of lead upon it; on the top of the middle of the vessel place a hollow ball of copper, with a pipe that may reach almost to the bottom of the vessel, having a brass cock at top. Fill the vessel about half full of water, and blow into the hole of the clack; your breath will enter the vessel, and when in, the lead will press down the clack. Repeat this several times, and the vessel will be filled with air, and press upon the water; then, turning the cock, the water will spin out for a considerable time.

A the vessel, B the clack, C the hollow ball, D the brass cock, E the pipe by which the water is forced up. *See plate* VIII. *fig.* 1.

Another Experiment.

Let A A. *plate* VIII. *fig.* 2. be either a square or round vessel, with a division, H, through the middle, having a pipe at top, B C (here represented in a gardener's flower-tub) the end whereof must reach from the top almost to the bottom of the lower vessel, as at D; let there also come from the partition a pipe reaching almost to the top of the upper vessel, as at E: in the top of the upper vessel let there be another pipe, F, reaching from almost the bottom of the upper vessel, and extending itself through the figure of the gardener and his watering-pot: in the top of the upper vessel must be a hole, G. When you use it, fill, through the hole G, the upper vessel with water, then stop the hole with a cork; and, pouring some water into the pipe, B C, the water in the upper vessel will run through the pipe F into the watering-pot, and so continue till all the water in the upper vessel is run out. The water from the pipe B C pressing the air in the lower vessel, makes it ascend through the pipe E, and press the water in the upper vessel, which having no other vent but through the pipe F, it runs through the gardener and watering-pot into the pot with plants, and so on into B C over again.

A Figure standing on a Cube, or square Pedestal, to sound a Wind-instrument.

PREPARE a cubic cistern, A, *fig.* 3, *plate* VIII. to the lid whereof affix a copper concave hemisphere B, expressed by a dotted line, having at bottom one or two holes C C, let there likewise be a hole D in the top of the cistern, to pour in the water, with a cork to fit into it. On the top of the cistern fix an image of Fame, Mercury, or a trumpeter, with a small pipe of reed or brass concealed in the trumpet, which has a communication with a pipe that goes through the figure. At the foot of the figure, where the pipe begins, have a little brass cock E; there must likewise come out near the side of the hemisphere a little short pipe F, having a clack within. Fill the cube or pedestal with water, about the third part full, blow then into the hemisphere divers times through the pipe F, and the air will force the water out of it, and make it rise round the sides; turn then the cock E, and the pressure of the water will force the air out of the pipe, and cause the trumpet to give a sound.

A Pitcher, which holds Wine and Water separately; a Device which will deceive such as are unacquainted with the Secret.

LET the pitcher A, *fig.* 4, *plate* VIII. have a partition B in the middle, which must have divers little holes bored through; the handle C must be hollow from top to bottom, and have a communication with the inside of the pitcher, and, by a pipe, through the middle of the partition. If you fill the lower part with water, and stop with your finger or thumb the hole at the top of the handle D, and then fill the upper part with wine, neither of them will mix together; but if you withdraw your finger from that hole, you will have the wine and water mixt: with pouring the wine first in your glass, you will serve yourself with good wine; and, with drawing your finger, you will serve your guest with wine and water; or, if you have drunk all the wine, you will serve him with water only.

Another Experiment, to procure sounds by Air and Water.

GET an earthen vessel, or one of glass, made in the shape represented in *fig.* 1, *plate* IX, at A, having a little hole at the top B, into which you fasten a reed or pipe C; it must likewise have a little hole at the bottom D. If you press this vessel in a tub, or pail, with water, the air in the vessel A will force its vent through the little hole B, and cause the pipe to give a loud sound.

A Water-dial.

PREPARE a vessel A B, *fig.* 2, *plate* IX. with a round opening at top, to receive another light vessel C, fitted for that opening, and of an equal height, closed at top and bottom; on this fix a little figure, representing either Time or Death, holding a small cord in his right-hand, the one end whereof is wound about a spindle, to which is fixed the index for the dial D, which is placed on a pillar standing on the square vessel. Fill that vessel A B with water, and place the other, C, on the surface within the opening: having fixed a little cock E towards the bottom of the lower vessel, and placed the index right, turn the cock, and the water will slowly empty itself by drops out of the vessel A B, and thereby cause the figure to sink lower and lower, pulling all the while the little cord with the index, shewing the hours of the day*. The ingenious artist will apprehend the construction of this little whim by the representation, more than by the description.

Another Water-dial.

Prepare a glass tube A, *fig.* 3, *plate* IX. of about two or three inches diameter, and twelve or more inches high, open at top, to pour in the water, and to convey into it an index of wood B, which shall shew the hours of the day. Then fix the tube, which at the end has a small orifice, to a bottom of wood, to cause the water to drop into another vessel, here represented by a shell C. The index pointing to *one*, mark out the rest upon the tube by your watch or an hour-glass, till all the water is sunk to the bottom, and dropt into the shell. Then turning the cock, and taking off the cover from the top, you may give it a fresh charge of water, as may be requisite for that hour of the day, when you put it in. The index B stands now at the hour of five.

Another Water-dial.

Cause a tube, *fig.* 4, *plate* IX, to be made of glass, tin, or copper, which may be hid in a wooden clock-case, having a dial-plate on the top of it; behind the dial you must have a frame-work, with a spindle, to which is fastened the index to shew the hours: one end of a fine cord is fixed to the spindle and wound round it, the other end to a little block, which, when as it were the clock is wound up, or set going, must swim on the surface of the water in the tube. At the bottom of the tube must be a small hole for the water to drop into a pan, which is placed for that purpose underneath it, and hid within the pedestal; and as, by the dropping of the water, the little block sinks down, it will draw the cord after it, and the index in the dial-plate will point to the hour.

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* The diameter of the cock must be so proportioned as to let out no more water than will cause the figure to sink and pull the dial from 12 o'clock to 1 in the space of an hour. *Ed.*

To make an Image that shall always turn, and stand upright, in a Glass of Water.

Make the lower part of the image of a man of wax, (*See plate* X. *fig*. 1) and the upper part of wood; then paint it all over with oil-colours, and put it into a suspended glass globe, which has an opening at bottom, having a foot fixed and cemented to it after the figure is put in. Which way soever the globe turns, the image will hang or stand upright in the middle.

Another Water-dial.

Prepare a cistern A A, *plate* X. *fig*. 2. with a transverse partition in the middle. Fix a pipe B from the upper, to nearly the bottom part of the lower, cistern; another short pipe C, must be in the bottom of the upper, for the water to drip into the lower, cistern. There must also be a small pipe D, with a long neck and cock at the lower cistern, which you may close or open at pleasure. To the upper cistern fit a board E, with a leaden covering on top, so as it may slip up and down with ease. Fasten a string to the middle of the board, and poise it so as to hang level, and at the other end a weight F, not quite so heavy as the board. This done, prepare a case, to the top of which fasten a spindle with a pully, the groove or crevice whereof furnish with little short pins, or make it rough, that the cord, which slides upon it, may be the apter to pass more regular and steady. Let one end of the spindle come out of the middle of the dial-plate, and an index fastened to it to shew the hours of the day; then fill the upper cistern with water, and the board will press it down, and through the pipe C it will empty itself by drops into the lower cistern, and cause the spindle with the index to turn round, and shew the hours in the dial-plate. When the water has emptied itself out of the upper into the lower cistern, then blow, having turned the cock at the hole or pipe D, and the water will ascend again into the upper cistern.

Sounds procured by Air and Water.

PROVIDE an oblong square cistern or box A, *plate* X. *fig.* 3. having a funnel B, at top on one end, and a little cane or reed C coming out of the other end of the vessel, on the top of which place a bird. Towards the bottom of the cistern fix a crane D to carry off the water, as it comes into the funnel, from a cistern E, or other fall of water: being thus set to work, the air will enter the little reed, or pipe C, and cause the whistling of a bird.

If you will have several birds chirping, prepare a cistern, *fig.* 4, with divers divisions, one above another, each part having a separate pipe, proceeding from the body of each bird, which must have reeds or pipes concealed within them: likewise, to each part must be a crane, to carry the water out of one part down to the other.

A little Fountain.

LET A, *plate* X. *fig.* 5. be a bowl, furnished with water from a cistern B, supported by four palm-trees that have pipes in the inside, communicating with the bowl above, and the vessel C below.

The water which falls down the pipes will force itself up again through the bill of the swan D. The water which falls on the cover of the lower vessel will discharge itself through the mouth of the lion's head by a pipe E.

To prepare a curious Fountain for a Dessert at a grand Entertainment.

Let A, *plate* XI. *fig.* 1. be a table for a dessert; B the bason of the fountain, which must be hollow between the rock and shell-work and the surface, whereon are placed various figures of swans, dolphins, &c. contrived to spout water in small streams. The hollow part of that bason is plentifully furnished with water, from a large cistern in the yard, or the adjoining room or kitchen C, it then forces itself through the several figures and pipes, and thus causes the fountain to play with cascades, or any other decorations. The little model here will give you a hint of further improvements of your own.

Chiming of Bells, contrived to be performed by Water.

Cause a hollow cylinder A, to be made of wood, with a broad foot to it by which it may be supported upon the water it is to be placed upon in the box B. At the one rim whereof is a set of bells C C; and on the uppermost rim D a key to each bell, with a hammer to it, which, by the pins in the cylinder, by which the tunes are set, will be lifted up, and falling upon the bells, will cause a melodious chime. Underneath the box B, place a vessel to receive the water that should come out of a pipe at the bottom of the box.

To make a Thermometer or a Weather-glass with Water.

Cause two glass balls to be made, A, B; the upper ball, with a tube, to be much less than the lower one. It matters not being very curious about the lower ball; an ordinary bottle will serve the same purpose. Having provided both glasses, fix them into a frame according to the model, *plate* XI. *fig.* 3, or in any other fashion; then divide and mark the tube into as many equal degrees as you think fit. Fill the bottom-glass about one third with water, and rarify the air in the glass A C, until the water has rose to that degree on the scale you think most suited to the temperature of the weather. Put into the neck of the lower ball a little hollow crooked cane or reed, D, whereby the air may pass in and out, so as not to touch the water, then close it up with good cement, and it is done.

N. B. The end of the tube must reach down into the water of the lower glass, almost to the bottom.

How to prepare the Water for the above Weather-glass.

Take two ounces of verdigrise in powder, and infuse it in a pint of white-wine vinegar, till it has contracted a pleasant green colour, then pour off the vinegar, and mix it with a pint and half of distilled rain-water: add six ounces of Roman vitriol, in coarse powder, and let it stand till the vitriol be all dissolved; then strain or filter it through paper, and put it into a clean bottle, well stopped up, and set it by for use, as occasion requires.

A Pump by Mr. Conyers.

The structure of this pump is as follows: A A, *fig.* 1. *plate* XII. is the body of a ſquare tapering pump, made of oak, elm, or deal-planks, with a valve at bottom, *a*, B the bucket, in whose middle is a valve *b*; C the iron to raise the bucket; D the wood at the bottom of the bucket, containing the valve; E the handle for raising the bucket, to be managed by fewer hands than ordinary pumps are: (it may be altered so as to employ a horse, in mill-work, more advantageously than the strength of men); F, a square taper box forming the bottom, with holes in the sides, but open at bottom, in whose narrower part is inclosed the narrow end of the body of the pump; G an additional bucket, of larger dimensions, to be placed on the iron work of the pump about H, whenever it be needful to lengthen the taper of the pump, to raise the water more forcibly to a greater height; I, a flat spout to cast out the water, of the same breadth with the side of the pump; K the iron or wooden work set off, & bent back, if needful, and placed behind the pump, for the easier and fuller motion of the pump-handle which moves in it. This pump is eight feet and a half long, and one foot eight inches broad at top, and about eight inches broad at bottom, where it is inserted in the box. It throws eight gallons at a stroke; and twenty-one strokes being made in one minute, there are one hundred and sixty-nine gallons delivered in that time; whereby it is easy to compute what quantity is thrown out in an hour. This kind of pump may be made of a tree, bored through with a taper bore; and a basket may be used for the bottom of the pump, instead of the present box with holes in it.

A curious Engine, by which Water is thrown to a great Distance, by compression: the Tube turning every Way, is fitted to direct a jet of Water to places where Fire is to be extinguished.

WHAT is peculiar in this engine, is, that the jet of the water is continual and not interrupted, even when the sucker of the pump ceases to force. This engine is a square chest of copper A, *fig.* 2, *plate* XII. pierced above with many holes B B, holding within it the body of a pump E F M, whose sucker D E is raised and lowered by two levers C O, C O, with each of them two arms, so as to be wrought by the hands of a man; and each lever is pierced in the middle by a mortise, wherein an iron nail, which passeth through the handle of the sucker, turns when the sucker is raised or lowered. Near the body of the pump is a copper vessel I H K, which communicates with it by the tube G, with another tube K N L, which in N may be turned every way. To make this engine play, water is poured upon the chest, which enters in at the holes in the cover. This water is drawn into the body of the pump at the hole F. The sucker is first raised, and, when the same is depressed, the valve of the hole F shuts, and forces the water through the hole M, into the tube G, whose valve H being raised, the water enters into the pot, and filling the bottom, it runs through the hole K, into the tube K N L, and the hole of the tube G is shut by the valve H; the air in the vessel has no vent, and it happens, that when you continue to make the water enter into the vessel by the tube G, (which is much thicker than the aperture, at the extremity L, at which it is discharged,) it must needs be that the surplus of the water that enters into the vessel, and exceeds that which at the same time issues through the small end of the jet, compresses the air in the vessel, by which means, whilst the sucker is raised again, (that new water may enter into the body of the pump,) the compressed air in the vessel drives the surplus of water by its spring, in the mean time that a new depression of the sucker makes more water to enter, and causes also a new compression of air; and thus the stream of the water that issues by the jet is continual.

OF GROTTOS AND SHELL-WORK.

CONCERNING grottos in general, it must be remarked that few of these are to be met with in this kingdom, which has the greatest advantages by nature, and the best opportunities for collecting the most rare and beautiful shells of all parts in the known world. We shall therefore lay before the curious a plan for grottos, that may with ease and small expence be imitated in every private pleasure-garden, to the great delight and satisfaction of the owner, and all that may be admitted to the sight of them.

Let us suppose there is a canal, bason, or fish-pond, or a river flowing along the side, or in your garden. The water from one or the other may easily be conveyed by pipes, to what distance you pleaseh and consequently to that place where you intend to build your grotto; there you sink the ground to the depth you would have it, and make the advance to it by steps, or a sloping walk from the garden. Now as this place is to imitate and represent a natural grotto, cave, or cavern, frequently met with among cliffs, rocks, hills, and mountains, and to make them appear in the same manner and shape, rustic, confused, and without order, we must endeavour, in copying after them, to come as near the resemblance of nature as possible; for the nearer we come up to her, the more valuable, perfect, and artful the work will be looked upon and esteemed.

Having copied the natural rustic order, by natural rock-stones, or by glass, or furnace-cinders, and divided the apartments into their proper dimensions, convey the water from the main pipe to small ones; proceeding thence, in several branches, to proper places in the rock-work, unite them to hollow figures, or to the small pipes concealed in

them,

them, so as upon turning a certain cock, water may stream out. Thus, the grand and rustic work being compleated, and the figures for the water-works fixt to their proper stations, we now, by artful contrivances, ornament, embellish, and dress it up, in the greatest beauty and imagination that art can produce. For this purpose, we beforehand make choice of a quantity of various sea-shells, pieces of looking-glass, crystal, coral, amber, marble, agate; or whatever may add grandeur and beauty to the place. The pavement is commonly laid of black and white marble, or mosaic of various coloured pebbles. The figures, whence issue forth streams of water, are generally cast of lead. The entrance is ornamented with the largest shells: the most beautiful are reserved for the inside. They are fixed to the main grotto by a cement, which is prepared in the following manner:

Take of quick-lime six ounces, and a pint of wine; mix them, and let it stand five or six days, stirring it every day; after which, pour off the clear, and mix it with the powder of calcined flint-stones, which you pound in a mortar. You may give it what colour you please, by mixing some earthen colours among it.

The cement for the first and coarser work is made of two parts of white resin, four parts of bees-wax, melted together; to which add finely powdered marble, or free-stone, two or three parts, and one part of flour of brimstone; incorporate all together over a gentle fire, and afterwards knead it with your hands in warm water: with this cement you join the stones, cinders, or ore, first heating them a little before the fire.

The chief concern in building a grotto, is to be very careful in the choice of some grand design, for the structure and embellishments. *Plate* XIII. *fig.* 1. will, at first view, shew the effect of the front, which ought to be bold and grand. Here the figures should be in their full proportion, whatever they may be in the inside of the grotto. What light soever is let in, must be from the entrance; and, if more than one apartment, it is thrown in at an opening at top, by a sky-light. This instruction may be of service to gentlemen who are experienced in the art of building, as they may improve upon what is here advanced, to the best of their skill and knowledge.

Here follows a grotto in miniature, not only proper to adorn the toilet, but likewise to serve instead of a dressing-box.

A A *fig*. 2, *plate* XIII. is a nest of drawers, which has several divisions for different uses. B the middle large drawer: C C two deep side-drawers; D, a middle shallow drawer, for pens. E, an under drawer to contain writing-paper. F a looking-glass at the further end of the grotto G, which is garnished with the most beautiful shells, moss, crystals, coral, &c. H an ink-stand with a stopple of china-image-work: I a sand-box, of the same. K a box for wafers, of the same. L L two beautiful pyramids of shells. M a drawer; the front may be embellished with curious shells. The drawer B may be framed with shell-work; and the front be a picture enameled, or painted in water-colours, with a glass before it. N two front corner-supporters, carved and gilded, of the figures of turtles, or else natural turtle-shells. The two side pillars may include looking-glass, framed with small shells.

This explanation will be sufficient for the cabinet-maker, to improve his fancy and ingenuity in making useful and ornamental grottos, for the amusement of ladies, who delight in elegant works.

PART VI.

GNOMONICS;

OR,

THE ART OF DIALLING.

PROBLEM I.

How to prepare the fundamental Quadrant for the erecting of Sun-dials.

DRAW the line *a b*, *fig.* 1. *plate* XIV; erect thereon a perpendicular, *b c*; from *b* describe the arch *a c*, which is the fourth part of a circle, and containing ninety degrees. Then look for the elevation of the pole, or the latitude of the place where the dial is designed for; which, for example, for London, is fifty-one degrees, thirty-two minutes; subtract this from the ninety degrees, and there remain thirty-eight degrees, twenty-eight minutes. This done, divide the arch *a c* in three equal parts, each containing thirty degrees. The part *d e* divide again into three parts, each containing ten degrees. These ten degrees divide again in two, each containing five degrees, consequently from *a* to *f* thirty-five degrees. Divide *f g* in five single degrees. The complement of the elevation being thirty-eight degrees thirty-two minutes, draw between the thirty-eight and thirty-nine, between *f* and *g*, a line *b h*, which is the equinoctial; draw another across it *i k*, to make a right angle, and be either further or nearer, as *l m*, to the arch, according to the size of the dial you intend. Your fundamental quadrant is now ready, the use whereof you will see in the following problems.

PROBLEM II.

To prepare a superior Equinoctial Dial.

An equinoctial dial is one described on the horizontal plane, or on a plane parallel to the horizon.

Draw from the centre *a*, *fig.* 2, *Plate* XIV. as you think proper, the dotted circle *b*, *c*, *d*, *e*: divide the same by *c e* and *b d*, in four equal parts, by which *a d* will give the twelfth hour, *a e* the sixth morning-hour, and *a c* the sixth evening-hour: again, divide each quadrant in six equal parts, and the whole circle into twenty-four, the number of hours of day and night; then draw from the centre *a*, through those divisions, the hour-lines, as you see in *fig.* 2, this done, erect a *perpendicular stile*, according to the proportion of the dial. Fix it parallel to the horizon, so that the line *b d* be parallel to the meridian. Fix the elevation according to the equator, and the dial will shew the hours exact. This dial shews only the hours from the vernal to the autumnal equinox, that is, in the spring and summer; in autumn and winter it is of no use. If you will bring in the half hours, divide the spaces between the hours in two, and if in quarters, divide again the half hours in two. In the elevation of this dial you will do best to cut one of pasteboard, or of wood, after the fundamental quadrant, *see fig.* 1; and if the place on which the dial is to be fixed is horizontal, to support it so that it may rest on the side *b h*, and the lower part *a b*, to be parallel to the meridian, and so that *h* may be towards the south, and *b* towards the north.

PROBLEM III.

To make an inferior Equinoctial Dial.

DESCRIBE about *a* the semi-circle *b*, *c*, *d*, draw the line *b d*, which gives the two six-hour-lines; and from *a* draw the perpendicular *a c*, which gives the twelfth hour; divide again the four quarters, namely, *b*, *a*, *c*, and *d*, *a*, *c*, in six equal parts, through which, from the centre *a*, draw the lines for the hours, as is expressed in the figure. The elevation is after the same manner as the former.

PROBLEM IV.

To make a superior Polar Dial.

TAKE from the *fundamental quadrant*, *fig.* 1, *plate* XIV., the length *b k*, or any other length, shorter or longer, according to the bigness of the dial. Describe the circle *b*, *c*, *d*, *e*, *fig.* 4, *plate* XV. from the centre *a*; divide the same with the line A B, or *b d*, and *c e*, in four equal parts, then will A B give the equinoctial, and *c e* the twelve-hour-line. Then draw to the line A B the two parallels *f g* and *h i*, the width of *a c* and *a e*: divide each quadrature of the circle in six, and the whole circle into twenty-four equal parts; draw from the centre *a* through such divisions unto the lines *f g* and *h i*, the lines *a f*, *a h*, *a m*, *a n*, *a o*, *a r*, &c. then draw *f h*, *m n*, *o r*, &c. together, where the central or hour-lines intersect the lines *f g* and *h i*; over and under each of which perpendicular lines, you mark out the hours, in their order, as you see in the figure. The gnomon or stile you erect perpendicular,

pendicular, with a sharp point in the centre *a*; not longer than the breadth of the semi-circle, or the measure you have taken from the *fundamental quadrant*. The dial itself is elevated according to the latitude of the place, so that *h i* be towards south, and *f g* towards north. This dial indeed shews the hours of the day throughout the year, but no longer than from six in the morning to six o'clock in the evening, and not quite so long.

PROBLEM V.

To make an inferior Polar Sun-Dial.

You proceed in the making of this dial as in the former, with this difference only, viz. not to mark in more hours than are set down in the figure, by which you will omit what is of no service. The elevation is the same as in the superior; *f g* towards north, and *h i* towards south. A B in this, as well as in the superior, must be placed parallel to the horizon. *See fig.* 5, *plate* XV.

PROBLEM VI.

To make an erect direct Oriental Sun-Dial.

Draw the line *a b*, *fig.* 6, *plate* XV. which represents the horizontal line; take, out of the *fundamental quadrant*, *fig.* 1, *plate* XIV. the width *b l*, and, setting your compass in *a*, describe the arch, *c d*, of the same length as that in the fundamental quadrant; draw from *a*, through *d*, the line *a*, *d*, *e*, which is the equinoctial, according to the arch *c d*, so much elevated above the horizon as the equator is really elevated over that. Take, further, out of the *fundamental quadrant*, the length *b k*, or, at your pleasure, longer or shorter, and describe from the centre *o*, on the line *e a*, the circle *g*, *h*, *i*, *p*; draw to *e a*, the width of the semicircle *o i*, the parallels *f*, *u*, X, *y*: divide the circle through *i g*, with *h p*, in four equal parts; again, divide *g p* and *p i*, in twelve equal parts; then draw through them, from the centre *o*, the lines *o m*, *o n*, &c. In like manner on the other side, *o q*, *o r*, &c. so that the *fig*, 3, of both sides are drawn through the centre, also backwards towards *x* and *f*; at last, draw *q*, *m*, *r*, *n*, &c. as you see in the figure, together, and they will denote the lines of the hours; which you may draw to what length you please, according to the size of the dial. Then erect the gnomon or stile, perpendicular, the length of the semi-diameter *o i*; place the dial so as for the plan to be perpendicular towards the east, but the line *a b* parallel to the horizon. This dial will shew the hours in the morning, until eleven o'clock.

N. B. The figure of this dial represents it in the form of one side of a cube; whereon, in the front, may be drawn a meridian; on the other two sides, an oriental and occidental; behind, a septentrional, and at top, a horizontal sun-dial.

PROBLEM VII.

To make an erect direct Occidental Sun-Dial.

THE drawing of this sun-dial is in most respects the same with the former, only that it is done the reverse way, *i. e.* it shews the hours in the afternoon, as that does those in the forenoon; the figures therefore must be placed according as you see in the print. This may serve for the other side of the cube, or behind the oriental sun-dial which you may fix on a supporter, and place before a window in your room, or in your garden. *See plate* XVI. *fig.* 7.

PROBLEM VIII.

To make a direct Meridian Vertical Sun-Dial.

DRAW the line *b c*, *plate* XVI. *fig.* 8, which will give the sixth-hour line, and from *a* draw the perpendicular *a e*, which will give the twelfth-hour; take with your compass the width *b k*, from the *fundamental quadrant*, and place the same from *a* to *d*; draw through *d* the line *f g*, parallel to the line *b c*. Take farther from the fundamental quadrant the width *b i*, place it from *d* to *e*; draw through *e* the line *h i*, parallel to *f g*; and from *e*, with the width of *e d*, describe the semi-circle *k*, *d*, *l*: divide the same in twelve equal parts; draw through these divisions, from *e*, the lines *e f*, *e m*, *e n*, &c. Draw likewise from *a*, through *f*, *m*, *n*, &c. the hour-lines, as the figure shews, and the dial is ready drawn; the elevation whereof is fronting exactly towards south, perpendicular. The gnomon is made either of wire or tin, *fig.* A and B, *plate* XVI. according to the heighth of the equator, as here thirty-eight degrees, twenty-eight minutes; or, according to the *fundamental quadrant*, the angle *a*, *b*, *h*.

PROBLEM IX.

To draw a septentrional direct Vertical Sun-Dial.

DRAW the line *b c*, *plate* XVII. *fig.* 9, as the sixth-hour line; erect thereon the perpendicular *a e*; place thereon, from *a* to *d*, the length *b k* from the *fundamental quadrant*; take likewise from thence the length *b r*, and place it from *d* to *e*; draw through *d* and *e*, the parallels *f g*, and *h i*; and from *e*, the semi-circle *h*, *d*, *i*: divide the same into twelve equal parts; and draw to the first of them the lines *e f*, *e k*, *e l*, *e m*, *e n*, *e g*; again, draw from *a*, through *f*, *k*, *l*, *m*, *n*, *g*, the hour lines *a f*, *a k*, &c. and your dial is drawn; which, with its plane, must be perpendicular, fronting the north. The gnomon must be erected in *a*, so that it may be exactly over the line *a e*, turned upwards, and be as high from its plane as the equator, or the angle *a*, *b*, *h*, in the *fundamental quadrant.*

PROBLEM X.

To make a Horizontal Sun-Dial.

Draw the line *b c*, *plate* XVII. *fig.* 10, for the sixth-hour-line, and from *a*, the perpendicular *a e*, for the twelfth hour. Take from the *fundamental quadrant* the width *b i*; place the same from *a* to *d*, and draw through *d*, the parallel *f g*; further, take from the *fundamental quadrant* the length *b n*, and place the same from *d* to *e*, and draw through *e* the parallel *h i*: describe, with the same width, round *e* the semi-circle *k*, *d*, *l*; divide the same in twelve equal parts, draw through them the lines *e f*, *e m*, *e n*, &c. and from *a*, the hour lines *a f*, *a m*, *a n*, &c. lengthen the first three on both sides through *a*, over *b c*, as you see, according to which you mark down your figures, and the dial is done. The gnomon must be erected in *a*, over the line *a e*, according to the elevation of the pole, or the angle in the *fundamental quadrant.* The plane of this dial must be fixt parallel to the horizon: *a*, to front exactly south, and *e* north. This dial is the completest of all the rest, for it shews all the hours of the day throughout the year. Figures A, B, C, are gnomons.

PROBLEM XI.

To make a Sun-dial in the Shape of a Cross, which shall shew the Hours, without a Gnomon or Stile.

CAUSE a wooden cross to be made in the form of *fig.* 10, *plate* XVIII. which at *b c*, is two inches and a half; *b a*, four inches; *a d*, twelve inches; *e f*, eight inches and a half; *e* 6, three inches; and *d* 6, three inches and a half; so that *a b c*, *e* 6 *d*, and, consequently, all the other corners, are right-angles. Paint it over with oil-colour, if it is to stand in the open air; or with size-colour, drawn over with a varnish, if not much exposed to the weather. This done, take a sheet of paper *a*, *b*, *c*, *d*, *fig.* 11, draw or describe thereon a quadrant, as *e*, *a*, *b*; divide the same into six equal parts with *m*, *n*, *o*, *p*, *q*, and draw through them the lines *a m*, *a n*, *a o*, *a p*, *a q*; lay the said sheet on a smooth table, and lay the cross with the corner *a* upon the centre of the quadrant; the side of it *a b*, place just under the centre of the cross *a e*, and observe where the lines *a m*, *a n*, *a o*, *a p*, *a q*, pass under the cross which will be in *r*, *s*, *t*, *u*, which points you mark upon the cross; then lay the quadrant with the centre *a* on the corner of the cross *f*, so that the line *a c* of the quadrant run under *f g* of the cross; observe again where the lines *a q*, *a p*, *a o*, underneath extend, and mark the points of them on the cross. Again, lay the quadrant with the centre *a* under the corner of the cross *h*, so that the line *a b* of the quadrant be just under *h x*, and mark down the points on the cross. Further, lay the quadrant with the centre *a*, under the corner of the cross *k*, so that the line *a b* of the quadrant run just under *h x*; mind where the lines *a m*, *a n*, under *f x*, run, and mark down the points. Thus proceed likewise with the sides *i y*, *y g*, and *z*; draw then from the marked points all streight lines, like those for example in *fig*. 12. Proceed thus all round, and write down the hours as you see in *fig*. 12, and the cross is finished. Then cause a little board to be cut as you see in *fig*. 13, on which make the angle *a*, *b*, *c*, according to the elevation of the pole, or to that of the *fundamental quadrant*, at the top whereof fix two stays, as *e e*, and bore at the bottom a hollow or notch, as *f*, and have a foot or stand turned to it, as A in *fig*. 10, on which place the board perpendicular, securing it with a pin to the stand, by boring two holes in the cross, for the stays to fit in. The structure will, when all put together, make an agreeable ornament in a garden, or other place. The side *d a* must be just towards east, and *e f* towards south.

In this manner you may make other shapes of sun-dials, as that in *fig*. 14, and *fig*. 15. The four hollows in the cross *fig*. 14. you may furnish with particular dials, which either by their corners, or else by a gnomon, may shew the hours of the day. So that *a* be a polar superior, *b* an oriental, *c* a polar inferior, and *d* an occidental one. These hollows must be cut out exactly in a semi-circle.

PROBLEM XII.

To make a Sun-Dial in a Ring.

CAUSE a ring, *fig*. 16, *plate* XVIII. to be made of tin, brass, or copper, of about one foot diameter, and six inches high, or wide, with a small round hole, or a crevice, across from one side to the other, as *fig*. 17, adjoining, then draw on a sheet of paper a semi-circle, *b*, *d*, *c*, from the point *a*; divide the same in twelve equal parts. Place the ring with the round hole or crevice exactly over the centre of the semi-circle *a*, and see where the lines upon the paper under the ring extend themselves, observe within the compass of the ring such points, and from them draw the hour-lines on the ring perpendicular, so as to form right angles; write on them the hours, as the print shews: elevate the ring with *a*, according to the elevation of the equator, and the sun will shew in the inside of the ring the hours, through the round little hole, with a bright dot, or a stroke across through the crevice.—This dial only shews from seven o'clock in the morning to five in the evening.

PROBLEM XIII.

To make a moveable universal Sun-Dial on a Globe.

CAUSE a perfect, round globe, *fig.* 18, *plate* XVIII. to be turned; find with a pair of calliper compasses the middle thereof; to which you draw round a line 6, 6; divide the same into twenty-four equal parts, and write thereon the hours of twice twelve, and the dial is ready: then cause a stand to be turned, the top whereof is to imitate a cup for the globe to rest upon: lay the same, so that the line 6, 6, with 6, 5, be always elevated according to the equator, the upper 6 towards south, and the lower towards north; one 12 towards east, and the other towards west. Thus shall the sun illuminate it in one part, and leave a shadow on the other; and wherever the light separates from darkness, there it denotes the hour of the day.

You may, at an equal distance from the lines 6, 6, describe two small circles; divide them likewise in twenty-four equal parts, erect a gnomon in their centre, and thereby mark down the hours, so that where upon the line 6, 6, is 12, you place the 6, and so on.—Thus will you have two equinoctial dials, which, however, at the time about the equinox, are of little or no use.

This globular sun-dial would be one of the completest, if it light and shadow were more distinct; but as night and day are parted in the dusk, it has the same effect on this dial. However, if the different countries are marked out on the globe, they will shew where it is night, and where it is day.

PROBLEM XIV.

To make all manner of Sun-Dials, regular or irregular, either on a smooth or raised Surface.

TAKE a smooth board, *a, b, c, d, fig* 19, *plate* XVIII. about eighteen inches wide, and twenty-one inches high, draw on it an exact horizontal dial *e*, and erect the gnomon according to the rules already given. Then take the intended figure for your other dial, and examine what sort of sun-dial will best correspond with the make and shape, according to which erect a gnomon or stile; fasten the body on an even board, so that the gnomon be directly towards that part of the heavens for which it is designed; then move the board, with the horizontal dial, at sunshine, till the shadows shew a certain hour, then examine where the shadow of the gnomon is cast on the body of your figure, according to which you draw a line. Turn the horizontal till the shade shews directly another hour; remark the same upon the body of your figure, according to the shade cast from its gnomon. Thus proceed, so long as you can mark out any one hour upon your figure; then elevate it with a supporter, *fig*. 20.

To prepare a Plummet, of great Use in placing and fixing of Sun-Dials.

AS it is highly necessary for elevating and fixing of sun-dials to be furnished with a plummet, the same may be made and used in the following manner; as you may see in *fig*. 21, where *a* [illegible] makes a right angle, and *d e* is divided into ninety degrees; so that when the whole structure is placed at *b c*, on a horizontal plane, the perpendicular *a f* will dissect always the forty-fifth degree: and by this you may examine a horizontal sun-dial, whether it be right or wrong elevated. If you will have the height of the equator, you place *b c* up, and count the height from the forty-fifth degree towards *d* or *e*: but since the elevation of the pole cannot be tried with this instrument, there is another, *fig.* 22, much better for answering all the purposes. You may prepare it thus: cause a board to be made of good dry wood, about twelve inches long, and six inches wide, planed very smooth and even, so that *a*, *b*, to *c*, *d*, be parallel to each other, and all the four corners be right-angles: draw, further, to the side *a*, *b*, an exact parallel line *e*, *f*, place thereon the semi-circle *e*, *h*, *f*; divide the same into one hundred and eighty degrees, to the centre whereof place a ruler *g h*, on a round pin, so that with the one edge it may dissect the semi-diameter into a quadrant, and free to move itself round its axis: write the numbers of the degrees from *h* to *e*, and from *h* to *f*, from one to ninety degrees, and the instrument is ready, and may be used for the following, and many other purposes.

1. If you will examine a horizontal plane, then place the side *c d* on the same; if the ruler dissects in *h*, a quadrant, the plane is right horizontal.

2. To examine the elevation of an equator, place the side *c d*, and see how many degrees the ruler cuts off from *h* towards *f*, or towards *e*, and whether they be as many, more, or less, as such an elevation contains.

3. To try the elevation of the pole, you proceed in the same manner as before.

4. To find whether a wall, or any thing else, inclines or reclines to which a dial is to be fixed, clap the side *a c* against it; if the ruler drops just from *h* to *e*, then there is a reclining; but if from *h* towards *f*, then there is an

inclination. You must observe this by the bye, not to place your instrument on the bare wall; but having first fastened a smooth board, or a rule, against the wall, and then made the above trials, you will prevent any defect in the dial, which might have been occasioned by the unevenness of the wall.

5. If you wish to try whether a place declines or not, you clap towards it the side *a b*, to the ruler you fix a rectified mariner's compass, moving the rule after it till the needle stands on the meridian line, and the ruler will stand exactly upon *h*, and thus is the place strait towards south, but if this cannot be found, the place declines. The instrument being clapt towards south, and the rule coming between *h* and *f*, the place declines as many degrees from south to east as there are between the ruler and *h*, the ruler coming between *h* and *e*, then the place declines from south to west; if the ruler comes to stand at *f*, the place is just towards east, if at *e*, just towards west; consequently ninety degrees from south and north. If you clap the instrument from north, and the ruler drops just upon *h*, then the plane of the place is also directly opposite north if it comes to stand between *h e*, then the place declineth from north towards east: is the ruler between *h f*, it declineth from north to west; of both, as many degrees as from *h* to *e*, or *f* are counted to be when examined.

PROBLEM XV.

To see by the Shadow of the Moon, on a Sun-Dial, what Time of Night it is.

LOOK into an almanack for the moon's age, either after the new, or the full; that is, count how many days there are since the change of either the one or the other. Multiply the number of those days by 4, the product whereof divide by 5, add the product to the time and hour which the moon shews on the sun-dial, the sum will give the right hour of the time. For example: the moon is 5 days old, you multiply that number by 4, the product is 20, divide that by 5, and there remains 4. Now if the gnomon casts the shadow upon 8, and you add 4 to that number, then 12 is the right hour of that time of night.

Of painting Sun-Dials.

We shall first shew in what manner to prepare the planes for them:

They, for the generality, are of two sorts; first, such as are against *the wall* of a building, or those drawn on *boards*. For the first sort, the wall is prepared by a plastering of lime, sand and hair mixed together; this, when dry, is well drenched with linseed oil, as long as it will suck in any, which afterwards is painted over with drying-oil and white-lead; thus it will be durable, and stand against wind and weather. Some temper the above mixture with ox-blood, and hold it much preferable for duration. If your sun-dial is to be done on a free-stone, then drench it with linseed-oil and whiten, very thin, till it will soak no more, this will make it more durable.

Dial-boards are the best made of oak, or of the reddest fir that is clear from turpentine. In preparing them, be advised to cut them to the length you intend your dial shall be of, of as many slips as will make up the whole breadth; then set them to dry: when you think that they are dry enough, so as to shrink no more, let them be shut with good joints, and glued together, and let every joint be secured with two wooden dove-tails. Let the face of the board be well planed, and squared every way. The framing about it must not be nailed to the boards, but they must have liberty; else by the confinement with nails, they will be apt to split, or warp, by the change of weather.

In order to have your dial-boards well glued, take a quart of water; set it on the fire, and put in it a pound of good glue, boil it gently till the glue is all dissolved, and of a proper consistence or body; and when you use it, let it be hot, and let the wood you are going to glue be free from soil or grease.

The colours requisite for painting of sun-dials are four in number: *viz.* 1. Spanish brown, for the priming. 2. White-lead, for the second colour, and for finishing the face of the table. 3. Vermilion, for drawing the lines for the hours. And 4. Lamp-black, for the figures in the margin.

If you intend the figures to be gilded, you must be provided with gold-leaf, and gold-size to lay it on; likewise with smalt for a blue ground. Some lay the ground whereon the figures are to be gilt, with vermilion.

Your dial-board and colours, with other materials requisite, being ready, you first prime your board with Spanish brown and linseed-oil, mixed somewhat thin, and with a large brush cover your board all over; the first colour being dry, do it over a second, and, if you will, a third time, with the same colour, somewhat thicker. The last colouring being dry, colour the face of the dial with white-lead; repeat this two or three times, and it will be the more defended from the injury of the weather.

The last colouring of your white being dry, draw on your plane, with a black-lead pencil, a horizontal line; and set out the margin for the figures of the hours: then take your paper draught, and let the horizontal line correspond with that you drew upon your plane; observe to place the centre according to the situation of your plane. If your dial is full south, then let the centre be in the middle; if it decline from the south, either east or west, then place the centre according as it declines, either towards east or west, having regard to the quantity of declination: if your dial declines eastward, let the centre be placed between the centre and the eastern side of your plane; if it decline but a little, then place the centre of your draught but a little from the centre of your plane.

When your paper draught is thus on the plane and fastened with tacks, let it be transported to the plane, by laying a ruler over every hour and quarter division, intersecting the boundary lines, for guides to the right placing of the figures.

Your dial-draught being transferred to the plane, you must be very careful in every particular to be exact, or else the dial cannot be good.

Having taken every thing requisite from your draught, and having transferred it to the plane, then take your draught off, and with vermilion draw the boundary lines of your dial, as likewise the hour, half hour, and quarter divisions, with good bodied colour, so as to draw a smooth and clear line, for this is to be done but once.

When your vermilion lines are drawn, then add the figures with lamp-black, and a spot between them for the half-hours. At the top of your plane you may put the date of the year, or some sentence, as is usual.

If you intend to gild your figures or letters, you first draw them exactly with gold-size; which is thus prepared:

Take yellow ochre, and grind it on a stone with water very fine, and lay it on a chalk-stone to dry; when dry, grind it as you do other oil-colours, only with fat drying-oil: but you must bestow a good deal of labour to grind the colour as fine as the oil itself, for then it will add lustre to your gold. You must give it such a quantity of oil as not to make it run when laid on, nor so stiff as not to work well, but so as to settle smooth and glossy. Silver-size is made by grinding white-lead; some add a little verdigrise, to make it bind.

When you have drawn the figures for gilding, let them sufficiently dry, so that when you touch them with the end of your finger, and it sticks a little without the colour coming off, it is dry enough. The figures being ready for gilding, have ready a book of leaf-gold; take a leaf with your cane plyers, and lay it on the gilding-cushion, blowing on it to lay it smooth; then with a cane knife, or for want of that, a pocket knife, cut your leaf-gold in pieces, in such forms as you think suitable to your work; then lay it on the gilding-palette, which is a flat piece of wood, about three inches long and an inch broad, upon which is glued a piece of superfine woollen cloth of the same length and breadth; breathe upon it to make it dampish, that the gold may stick to it; with this take up your gold, by clapping it on the several pieces, and transferring it to your figures; press it down with discretion, and having taken off your tool, press down the gold with some cotton, or a hare's-foot; thus you do, piece by piece, till you have covered all your size with gold; when it is thoroughly done, brush off the loose gold, and your gilding will shew itself beautiful.

Common painters gild more with silver than gold, in works that are not exposed to the air, to which they afterwards give the colour of gold, by means of a varnish made of gum-lac, dissolved in spirits of wine, and laid over it.

Painting of a blue ground with smalt, is the best way to strew it. The true method of performing it is thus: first temper white-lead with drying-oil; let it be stiff, and just fit to spread well from the pencil: with this, cover the superficies of the work you intend to strew with smalt, and if you do the margin of a dial on which the figures are already gilt, paint every part between them very exact, for the smalt takes no where but on the moist ground; then lay your work flat, and strew the smalt all over, stroking it even with a goose-quill; then, with a bunch of linen cloth that is soft and pliable, dab, and press it down close, to make it stick firm. When thoroughly dry, wipe off the loose colour with a feather, and blow the remainder of it off with a pair of bellows, and your work is finished.

N. B. In case you intend to paint any other kind of body in smalt to be shaded, as a blue bell, a blue boar, a blue peruke, and such like things, you first proceed as above, laying flake-white, ground with clear and fat linseed-oil, giving it those necessary shadows you think are requisite, with black and indigo, well tempered with linseed-oil, then strew on the smalt as before directed; when the whole is dry, the work will appear with all its shadows as exact as possible. You are always to lay first a white ground, for it is the only thing that gives beauty to the colour of the smalt.

In case the work to be strewed over with smalt does not lie flat, take smalt upon a flat bunch of cloth, or old linen rags, and dab upon the ground you intend to lay it upon.

PART VII.

A
DIRECTORY FOR THE MANAGEMENT
OF A
FRUIT, FLOWER, AND KITCHEN-GARDEN,
THROUGH EVERY MONTH IN THE YEAR.

IN this little treatise will be contained all the usual and necessary directions for the management of the ordinary gardens of private persons, where œconomy and the innocent comforts of the table are more desirable objects than the culture of expensive exotics.

It will be divided into three parts, viz. *Fruit-garden*, —*Flower-garden*,—*Kitchen-garden*; and each part will be again divided into the several months of the year, by which the reader may easily refer to the particular article required.

FRUIT-GARDEN.—*January*.

WHERE there are wall and espalier apple and pear trees yet unpruned, it may be safely, and ought without fail to be, performed; for the frost will not injure the trees in the cut parts, nor endanger them, though it happen in the midst of the operation.

You must take particular notice, that a wall-pear is very stubborn, and will run into wood in the middle, to prevent which, you must extend the branches horizontally, or side-ways, and suffer none to grow up perpendicular, you intend to keep them from shooting into large wood. The fruit-bearing branches ought not to come forward above four inches, and what projects further ought to be cut to half an inch of the great wood: care must be taken to prevent many knots, in order to hinder confusion.

Dwarf-pears ought not to be brought into too small a compass, for thereby they will be over-much confined, and look unnatural: they ought, indeed, to be thinned of all unnecessary fruitless branches, and kept free and open in the middle.

What is here observed with relation to pears, may likewise be observed with respect to the plumb and cherry trees.

After a shower of rain, cleanse your fruit-trees of moss which is very destructive to them: do this with the back of a knife, or a hair-cloth.

Gather cions from pears and plumbs, for grafting in the next month.

If the weather be open, you may safely transplant trees, and fill up vacancies.

You may now lay up a good stock of earth from rich wastes and meadows, to serve for several purposes, or to plant strawberries in the next month.

Cut off dead or decayed branches; also those that cause confusion, especially in the middle of the tree.

Pears, apples and plumbs against frames ought to be pruned this month, and their due height adjusted.

Roll your walks after frost and rain, which will effectually kill the moss.

FRUIT-

FRUIT-GARDEN.—*February.*

CONTINUE in this month to go on in the same manner as you did in the last; but beware not to let the knife touch your vine after it; for then it would, by immoderate bleeding, expend its sap: wherefore let your first work be that relating to your vine.

You may, after pruning, take the largest shoots of last year's growth, and put them sloping into the ground, about ten inches deep, leaving only one bud above ground: they will be fit to be removed into the vineyard, or other places, in two years time.

This is the proper season, if omitted in October, to plant vines, and all sorts of fruit-trees, be they dwarfs or standards.

Take notice, that the method for planting, and making of borders, &c. is found under the head of the month of October.

Make use of the cions cut off in last month; for the latter end of this month is most proper to graft pears and plums of all sorts, without regarding the influences either of the new or old moon, as superstitiously observed by many.

You now correct the disorder of the apricot and peach-trees; first by untacking them from the wall, and freeing them of all their dead wood, and shortening both wood and fruit-branches; remembering to lay the branches, as much as possible, horizontally, and the middle free from great wood and perpendicular shoots.

Keep open all drains, that the water may not stagnate, especially near the borders of fruit-trees, for they would receive great injury.

Plant strawberries, from the woods, in untried earth. Likewise plant raspberries in some shady place: you must take care to remove the dead shoots of last year from the roots, and to prune the tops of the new shoots.

Plant pears, plumbs and apples, against espaliers or frames; the portion of their height is to their distance from the wall: if they are set at twenty feet distance from the wall, they should be suffered to grow eight feet high; and so, more or less, proportionably: but the more distant from the wall, the better it is for both.

Now is the time to sow all sorts of kernels for the nursery, in soil that is not too untractable, nor too poor.

Continue to cleanse fruit-trees of moss, and to roll the gravel walks.

The most destructive enemy to dwarf-pears and plumbs is a tit, or tit-mouse, which, in hard weather, will make great havock on the bearing buds; but bird-lime is an effectual remedy to catch and destroy them.

FRUIT-GARDEN.—*March.*

At the beginning, it is high time to put an end to the planting of fruit-trees, and to fill up all remaining vacancies; also to finish the pruning of peaches, nectarines, and apricots.

Now it will be proper to shelter some of the earliest blossoms, to secure them from the cold frosts and dews.

It has been found by experience that a white Magdalen peach, not above a foot high, having one blossom out of three covered with a piece of glass, that blossom produced a peach, though the rest dropped off; and it was of a size by a third part bigger than ordinary.

The advantage a tender fruit-tree receives from a wall sheltered over, is very considerable; for it defends the tender fruit-bearing branches from extreme colds, which would otherwise cut them off in a severe winter.

This month is the most proper for removing and planting

ing hollies, yews, &c. which add so much beauty to a garden in the winter season.

The curious in grafting, busy themselves now among their apples and cherries.

The colds being now pretty well over, towards the latter end of the month examine your fig-trees, and what great wood can be spared, cut it close to the stem: the thickest shoots of last year commonly bear the fruit, and ought therefore to be preserved. Dropping a little oil on the young fruit helps to dilate the outward coat, and causes the figs to be larger than ordinary.

The heads of those stocks which were last summer inoculated, are now to be cut off sloping, two inches above the bud, beginning the slope opposite to it.

You will do well to remember, that the dead wood, called cock-spur, is to be cut clean off in the following year, in March, that the stock and cion may the better incorporate, and the wound heal over.

This cock-spur should also be removed with a sharp knife from all the branches of other trees.

In this month it is proper to make incisions on pears and plumbs, chiefly on the larger wood, and to carry the wound even beyond the pith, not only to hinder the free ascent of sap by the bark, but also through the pith.

With the same view, in order to make a tree more bearing, you may confine the passage of the sap to the pith only, in the lesser and perpendicular branches, by circumcising them of the bark for about two inches round, taking it entirely away to the wood. These branches will continue for several years to bear fruit; and when at last they die, there are infinite numbers of others that succeed them, especially in the middle of the tree, which ought to undergo the same discipline, if they are proud and ungovernable.

Cut off the heads of new planted trees against the wall, and reduce them with a sharp knife to three or four buds.

Prune also your peaches, plumbs, pears, and cherries that have had one year's growth; in which you ought to be very discreet, and do it according to the vigour or weakness of the tree. For some will leave too many branches, more than the root can well support; others cut off all to give, as they pretend, more vigour to the tree; but discretion ought to go along with the knife.

FRUIT-GARDEN.—*April.*

NATURE now exerts itself in the circulation of the juices, and in forming blossoms, leaves, and branches; yet this, of all other summer months, gives us most occasion to look about us, to see what our servants have done, and examine whether they have put the last hand to the winter-pruning and nailing; whether they have cleared the trees from all unprofitable branches. We shall find with pleasure the beginning of plenty in a full bloom, and nature put in the nicest order, if we still remember to guard her from injuries, and to keep off rough assaults, especially off those which have been new planted, either in autumn or spring; if we encourage them with water during the parching dry winds which usually reign in this month; and if we guard their roots with a circular paving of stones, or a small heap of weeds or grass, to keep them cool and moist.

Now narrowly watch your new planted trees against walls, rubbing off all such young shoots as push directly forward, leaving none but those that shoot sideways, to form the beauty of the tree.

What apples remain to be grafted may be completed this month, which is the time for grafting between the bark and the wood, when the sap flows freely, and suffers them to part.

Slit those cherry-trees that are not thriving, with the point of a knife, perpendicularly down their body and the chief branches. Some cherry-trees have continued in an unthriving state for fifteen years together, and after they have been thus slit, they have prospered to admiration.

Watch the new planted vines, and suffer not above one shoot, or two at most, to remain; for, the principal thing you ought to aim at is, to get large, and consequently bearing, wood as soon as may be, which is no otherwise to be done, than by taking away all the smallest shoots. There is a general failure in this point, for, if all, or most of, the weak shoots be suffered to grow on a young vine every year successively, you may wait seven or eight years without fruit, and then only at last see starved little bunches of grapes.

It is no wonder that blossoms or young fruit generally fall off the peach-trees, in this month, especially from some of the stronger branches; the reason whereof cannot be better explained than by the simile of a nurse's over-much abounding with milk, and affording it too freely, by which means the child is frequently in danger of being choaked. It is on this account I advise the laying branches of trees horizontally, and keeping them free from great wood, and perpendicular shoots in the middle, that the sap may be carried in due proportion, as is necessary not only to form blossoms but to feed the fruit. Hence it is demonstrable, that in order to have a sufficient quantity of fruit, too much vigour is as detrimental as too little.

Be sure to remove this month all suckers from fig-trees, and shorten some of the great wood, in order to fill the bottom with new branches.

FRUIT-GARDEN.—*May.*

Now vegetation exerts and displays its utmost force.

Suckers will be pushing forward from the stocks of trees, which ought to be carefully removed, especially from such as are new planted.

From vines, though they have been pruned, unprofitable shoots will be pushing forth, at innumerable places: these must be picked off in their very buds, if possible, the beginning of this month.

Nothing ought to be suffered to grow upon a vine, even in summer, but what is absolutely necessary for wood, fruit, and shelter. All besides these impoverish a vine. We may be assured that the neglect of this is the very thing that has discouraged most from entertaining any hopes of success.

Tie up the shoots of the vine to their props or frames, leaving only three or four of the boldest shoots. Disengage such branches as are, sometimes, behind the larger wood. The latter end of this month employ yourself in nailing the most forward projecting branches, where fruit is, close to the wall. Through the neglect of this many grapes never come to maturity, but are starved with winds and dews.

Pick off, carefully, the canker from apricot and wall cherry-trees; and thin both peaches and apricots of their superfluous fruit, in order to make the remaining grow larger. This work, though it is done with reluctance, ought nevertheless to be complied with, because one good apricot, or peach, is worth twenty bad ones.

In this month you shorten the running-out branches in all your fruit-trees, not leaving above two inches remaining, to the stem.

You now begin the summer-pruning of pears, and cut off the shoots to half an inch, taking out the rest in the middle entirely where crowded; but at the extremities of the tree, if room, they may be let alone to the winter pruning; only, the perpendicular shoots, in the middle of dwarfs, you reduce to half an inch, and they will put forth bearing branches.

You ought not to neglect weeding strawberries, and to take away the runners, during the time of their bearing fruit. Raspberries indeed do not require that care, but rather do better without it: you must likewise water them in dry seasons.

Look carefully on all your new planted trees, and in case you observe any of them to be in a declining state, shelter them with boards and mats, for such as are weak, are apt to be overpowered by the heat of the sun, and shrink and die away.

Clip off the extreme shoots of gooseberries, for this will prevent or kill the canker-worm, which, by laying its eggs, and breeding there, often destroys the leaves, and makes the fruit insipid.

Ants hurt and injure the roots and smaller fibres of peach-trees. The following method is here inserted for their destruction.

Cut dew-worms in small pieces, and strew them in places some distance from their habitations, they will quickly resort thither for food, and then, by the help of a watering-pot and scalding water, you will easily destroy them.

FRUIT-GARDEN.—*June.*

REGARD the overgrowing vine-branches by the first summer-pruning, shortening them at the second or third bud beyond the fruit: but in case a vigorous branch is wanting to fill up a vacancy for the next year, you had better leave that alone.

Continue to nail those bunches of grapes which project too much, close to the wall, or pales.

By the 30th of this month you may expect the blossoms of the vine, which will perfume the whole air about it, especially on a hot sunshiny day.

You now give the summer nailing and pruning to peaches, apricots, and plumbs, in order to expose the fruit to the sun, and cut off those shoots whose leaves are infected by lightning or blights.

Now you clip your thyme, and box-edgings, as likewise all ever-greens, which add beauty to the walks, and to the whole fruit-garden, especially in the winter-season.

You must not forget to roll the gravel-walks after rain.

FRUIT-GARDEN.—*July.*

THE vines are now in their full strength and vigour, insomuch that great confusion will ensue if they be neglected and left unpruned, and the fruit will have little benefit of the sun; therefore, if from a vigorous shoot, already pruned, there shoot several Midsummer shoots, take them off, sparing only one with one bud upon it.

There is no danger in exposing the grapes this month to the sun, for though the leaves and wood be thin, the autumnal shoots will soon shelter them again.

Old vines, indeed, that run high, and bear chiefly out of the knots of the old wood, make not so much confusion: one winter and one summer pruning will do. But the want of sap and vigour to feed the extended branches, is the case why we cannot expect early, large, and good grapes.

Good soil and climate, or artificial heat, do wonders; but it is best to trust to the strongest young wood, in order to procure the best and largest grapes.

Expose your apricots to the heat of the sun, by removing some of the leaves, that the fruit may take its colour and beauty. The same care is to be observed, in the latter end of the month, to peaches; and if any strong wood or water-shoots push from the apricot or peach-tree, except they serve to fill up a vacancy, they ought to be taken off. Preserve their young short branches, by nailing them to the wall. Inoculation may now be continued with safety, after rain, of pears, plumbs, and hollies.

If a pear-tree is over vigorous, cut off all branches that push forward, to half an inch.

You should now water your peach-trees plentifully; it will prove advantageous in swelling and ripening the fruit. If you omit it, the fruit will drop off, as will the fruit-trees, in pots, in case you do not water them daily.

Weeding and houghing ought to be carefully minded, to keep clean the borders and alleys, and hinder the weeds from seeding. You must likewise destroy, as much as possible, flies, earwigs and ants, which in this month are great enemies to apricots and peaches. Neglect not to roll the gravel-walks after rain.

FRUIT-GARDEN.—*August.*

YOUR chief exercise in the fruit-garden for this month, is in gathering the fruits of the labour you have bestowed on it in the winter and spring: however, some amusement may be found in employing your hand in inoculating of pears, plumbs, and hollies.

Continue the pruning of those vines that were neglected the preceding month, keeping the fruit as close to the wall as possible, and shadowing them discreetly with leaves sufficient to defend them against the cold nights.

The vineyards begin now to suffer, if they are not sheltered. You must therefore carefully watch that nothing may be wanting, but yet nothing superfluous.

Cut your strawberries, after they have done bearing, close to the ground, that they may put out new leaves before winter.

Expose your apricots and peaches to the sun, to perfect their ripening, and to give them beauty and richness of taste.

You may with great safety remove ever-greens, the latter end of this month.

Unbind those inoculations that were performed last month, lest the stock be galled with swelling; for in three or four weeks time the bud will incorporate.

Be careful, in gathering apricots, that you do not break the branch whereon they grow, because thence may produced another bearing branch the next year, neither ought you to thumb them, by way of trial of ripeness, because it will make them rot.

If you can keep the morella-cherry on a north side, to which it ought always to be planted, from birds, until the end of this month, or the beginning of next, they will lose a great deal of their acidity, and be a rich and noble fruit.

FRUIT-GARDEN.—*September.*

THE delicious products of our gardens are now ripe, viz. grapes, peaches and nectarines. All these rich fruits, if you would preserve them entire, must be well guarded against wasps and flies, by hanging up vials of ale and honey mixed.

The old Newington peach now presents itself in its greatest beauty and perfection, though it is very apt to fall from the tree before it is quite ripe: but when preserved to its full ripeness, it is a delicacy not much known out of England.

It is not too late to inoculate pears with success; but forget not to release those buds inoculated the preceding month.

The latter end of this month, in dry weather, is the proper time to gather such pears as will be ripe in October. Those which are now ripe, are the summer Bon-cretien, Hamden's bergamot, orange-bergamot, and russelet.

Still be diligent to keep your fruit from wasps, ear-wigs, and ants.

FRUIT-GARDEN.—*October.*

BEHOLD the decay of vegetable nature, which now shrinks at the approach of winter. It is now the time to turn out all unprofitable things, and get new ones in their stead, that may give us better hopes. We ought now to supply the defects of our old plantations, and to make new ones: for which end, prepare the ground and borders with untried earth, without mixture and adulteration; for nothing is more hurtful and prejudicial to fruit-trees than dung. A middling virgin-earth, that is neither too poor, nor very rich, is the best.

If the borders are four or five feet wide with this earth, you need not lay it above one foot deep, that the roots may be encouraged to run horizontally: for if they run downwards, they will produce perpendicular shoots upwards; which, in peaches and apricots, end in canker, and in death.

This being so busy a month for planting, you ought to lay in a good stock of untried earth, to be ready upon all occasions.

If your soil be naturally subject to wet and moisture, you must plant your trees high; for it is certain death for peaches and apricots where water stagnates in winter: and if your soil is dry and warm, it is much preferable to plant in this month than in the spring.

In planting your vines, a wall four or five feet high is sufficient: you ought to plant them six or seven yards asunder; and in case they were planted thicker, the overplus should be removed in four or five years, that the branches may have room to run horizontally.

The properest mixture of soil for vines is the rubbish of old buildings, composed of lime and mortar, or sea-coal ashes, or drift-sand; either of these, mixt with an equal quantity of rich warm earth, will answer the end.

Make the borders four or five feet wide, and one foot deep, sloping and descending towards the south: to mix dung with the mould is poison to a vine.

If the season has been favourable, your diligence will now be rewarded by gathering of ripe grapes; but to do this, you ought to wait for fair and dry weather. This you must likewise observe in gathering your pears, which afterwards you lay up singly, on shelves made for that purpose, in some upper room or garret. In frosty weather, you must shelter and defend them from it, with clean straw laid over them. Such winter-pears as ripen not till Christmas, as Colmars, Winter Bon-cretiens, &c. you may suffer to hang on the trees till the latter end of October. Such as are curious may tie paper over them, to preserve them from frost.

FRUIT-GARDEN.—*November.*

You may carry on planting of fruit-trees of all sorts, which were neglected in the former month.

You may now nail the tender branches of fig-trees close to the wall, before the great frosts come on; but by no means shorten the branches.

Begin to prune pear and plumb-trees, especially dwarfs, and those on frames; but of all other works necessary to be performed in this month, is the pruning of vines for the winter season; this you must do with great judgment and discretion, if you will expect fair and good grapes; therefore, be sure to leave but few, and those the thickest and ablest, of the last year's branches, taking the small ones entirely away. Take care that no part of the wall be left naked, or unfurnished with bearing wood, especially towards the bottom, because that part has a double advantage, both of the wall and the border, to reflect the sunbeams; every year, some of the old wood must be cut down to the ground, with a view of having young wood to bear fruit the succeeding year, at the bottom of the wall, laying such branches as horizontally as possible: and to forward the ripening of such grapes near the ground, it will be proper to pave the borders with broad slabs, or slates.

The ablest branches of this last year's wood are to be pruned to about two feet long; and the rest, to about three, four or five buds; observing to leave one shorter, between two longer; by this means the grapes will be spread pretty equally when they come to grow; but, take care you crowd them not too much: near a foot asunder, especially the larger branches, is sufficient.

This month is a proper time to make nurseries for stocks of all sorts of fruit-trees, either by planting of the best plumb-suckers, or sowing of proper stones and kernels, to raise peaches and apricots, pears and apples.

Almonds and peach-stones will do well enough for stocks for peaches, in a rich sand or gravel-soil, but hazardous in a wet and strong one. Healthful trees, from wheresoever they come, cannot fail to grow in untried earth.

FRUIT-GARDEN.—*December.*

THE juices of plants and trees are at rest, and the cold frosts have spared none but evergreens; and there is little work left, except to finish what was left undone the last month. However, take notice of this:

The common practice of turning up gravel walks in ridges, in this month, is certainly wrong; for we are not only deprived of the benefit of them all the winter, but it is a real tillage, and adds fertility to them, to the future great increase of weeds and grass. The best way, if they must be turned, is to stay till April, when they may be turned, and laid down again soon after.

The inquisitive naturalist has this month time and opportunity to make use of his microscope within doors, whereby he may discover those numberless eggs of little animals, lodged in the roots, the bark, the leaves, and tender branches of trees. These being devouring enemies of vegetable nature, and the cause of blights, he thus will be able to destroy them in embryo.

Having thus conducted the curious operator in a *Fruit-garden* through the several months in the year, and shewn him, in a familiar manner, the order of time, when and how to employ himself to the best advantage, we shall leave him to his further improvement in the practice of what is taught in this small compass, by observing those rules which he may depend on have been observed by experienced gardeners.

Before we conclude this subject, we shall extract a passage from Mr. Baddam's *Memoirs of the Philosophical Transactions*, No. 366, page 102, where, concerning the change of colour in grapes, we have the following account

“ In 1714, Mr. Cane planted a cutting of a vine against a wall, on an eastern prospect, where it had the sun from its rising till half an hour after twelve o'clock — The soil was a stiff clay, but, to make it work the better, he meliorated it, by mixing some rubbish or the foundation of an old brick wall in January, 1719, he pruned it, and its figure was thus left-hand Right hand At the time of the year it shot at both hands, about twenty-two inches of a side, before it became a joint. that on the right-hand was a very luxuriant branch, as big as the body of the tree, the other side was not half so thick or big, and the leaves on the right-hand were as big again as the other on the left hand, and the largest he thinks he ever saw. The right-hand bore a very large and good black grape, and large clusters, the left-hand were very good white grapes, and in 1719, he had more bunches of the white than the black and blue grapes the leaves dyed red, these dyed white on the black side, as well as on the other.

"In January 1720, he pruned the tree again, but tacked "up more of the right-hand (being black) than he did on "the left, for which reason he had that year a great many "more of the black than he had of the white, and they "ripened for the season of the year very well. About the "23d of October 1720, he gathered the last of them; and "the leaves dyed also white this year, being the second "year of bearing."

FLOWER-GARDEN.

We shall now give a list of several flowers, in the order of the several months, as they appear in bloom, with some account of the method of managing and propagating them.

FLOWER-GARDEN.—*January.*

Plant anemonies, both single and double, of various colours, you plant sooner or later, according as you would have them blow, from the beginning of October to Candlemas The earth must be a rich sand, mixt with rotten cow-dung and lime. In stiff grounds they rarely flower.

Keep off the wet, and severe frosts; but if dry weather in March or April, give them a little water.

If you perceive the stalks short, and the leaves but few, you may conclude they dislike the ground; and you will do best to take them up, in order to remove them to a richer and lighter soil. this you do as soon as you see the leaves turn yellow; in a month's time they will be dry enough, and may be kept in papers till replanted.

A little willow-earth is very proper to mix with the above compost, when you replant them.

Cyclamens are raised from seed, which you sow as soon as ripe in boxes, and in two years time you may transplant them. There are two sorts, the vernal and autumnal; the vernal is sown in the spring, and the autumnal in autumn. Plant them not above two inches deep.

If you propagate from the roots, do it in June or July, or before the time of blowing.

Snow-drops. They increase to admiration by the roots, which you may remove whenever you have a mind to do it.

Primroses, both single and double, may be increased by sowing the seed on a bed of fine earth, with a cover of rich mould upon them, about the end of August, transplant them the year after. The second spring you may expect flowers.

Plant tulips, various sorts of bulbs, ranunculuses, &c.

FLOWER-GARDEN.—*February.*

THERE are many sorts of irises propagated from their bulbs. Transplant them at the end of August, or beginning of September, in good rich earth, not much exposed to the sun.

Hepatica's are propagated of seed, sown in September, in good substantial earth, and transplanted as soon as they are fit; or of slips, in March and September. They are of several sorts.

Stock-gilliflowers. They are commonly raised of seed, thinly sown in April, in good light earth. When they are three or four inches high, take them all up, and throw sand upon the bed to make it poorer: plant them at a convenient distance. Repeat this for three succeeding months, to cause them to grow low. You may propagate them by slips of such as have no buds in the month of March; these you set three or four inches in good ground;

and they will blow in September. By frequently removing them they will thrive best, were it once every month.

Sow ten-week stocks, and mignonette.

FLOWER-GARDEN.—*March.*

POLIANTHUSES are now in blow; you sow in August or September, and transplant them the year after, as you do the primroses.

Also, *Daffodils*, of several sorts. They are taken up in June, and kept dry till September, when you set them in vacant places. To produce new faces, sow the seeds in September, and in two or three years the bulbs will be fit for transplanting.

Hyacinths, *Jonquils*, and *Auriculas*, are now blooming.

Hyacinths are of great variety, and hardy plants, shifted or sown, of seed in September. They will continue four years without transplanting, unless they produce too many suckers, and cramp the growth of flowers.

Jonquils are multiplied by the bulbs as daffodils, it being a species of them, plant them about four inches deep, and about the same distance. Their bulbs you set as soon as may be, or keep them for some time in moss a little moistened. Seeds you raise as you do of the daffodils.

Auriculas may be raised of seed when nearly ripe, and the stalks turn yellow, about June. Take care the wind don't blow the best seed away at top. You sow it in boxes about the beginning of September, upon fine, sifted, light, rich earth, it will be six months before they appear; then remove them out of the sun in some shady place, else your labour is lost. Water them gently, as you see occasion, till fit for removing.

Some of the preceding month will continue blowing in this.

FLOWER-GARDEN.—*April.*

In this month are the following:—

Wall-flowers, both single and double: they are of several colours. They are increased in the same manner as stock-gilliflowers, by slipping or sowing.

Ranunculus's; they are increased by their claps or clugs, which you plant in rich earth; old thatch, well rotted, and mixed with light mould is the best. You plant them two inches deep and four asunder, in November and December: they require frequent watering, if the weather be dry in March and April. They are taken up in June.

Tulips. Of these are a vast variety, and they produce every year new faces, but they all flower in March, April, and May. You multiply them by taking up the roots as soon as the stalks turn yellow, and when they are dry, lay them in boxes till September or October, then set them again three or four inches distance, and two or three deep, in light sandy ground, or among other flowers.

If you sow the seed, which is ripe in July, you must order your earth in boxes, laying a tile underneath, and filling it up with good light earth, then sowing your seed, and riddle upon them the same mould half an inch thick, in three or four years they will flower.

You may leave your tulip roots in the ground for two or three years without hurting them. However, the surest way is to take them up after they are blown.

Crown Imperial. They are of several kinds, propagated from bulbs, which you displant in June, and keep out of the ground till August. They require good rich earth, and will languish in a dry soil. Some are raised of seed, sown in August, but this is a tedious way. They flower in March and April.

Syringa's or *Lilac*, of several kinds, are propagated by

slips

slips or branches, with the root split, and set in a shady place till they be well rooted; after that you transplant them in a warm situation in November.

Laurustinus, is a pleasant flower-tree, raised of seed sown as soon as ripe, in good light ground, or of suckers, and layers.

Star-flowers are of various kinds; that of Arabia flowers in May, the star of Bethlehem in June, that of Naples, and the yellow, in April and May, and the Æthiopian in August. They delight in rich sandy earth, and are taken up as soon as their leaves are dry, and kept till Michaelmas before they are transplanted. The Arabian and Æthiopian require care in winter, and ought to be housed.

Marigolds are sown from the beginning of April to the end of May, to have flowers early and late. Remember in sowing, that you bury them not too deep, for the smaller the seed the thinner covering of earth is required: your ground must be good, else you lose your labour.

FLOWER-GARDEN.—*May*.

COLUMBINES you raise by sowing seed in April, they will flower the year after. In August the seed is ripe, and you may sow it again the same month.

Pionies. Of this flower is male and female. They are multiplied by the roots in October or November, set in a place not much exposed to the sun. The seed sown very thin in September, where it may not be disturbed for two years.

Lychnis, is an annual flower, and sown in April and May.

Satyrion, or bee-flower, the bulbs whereof are planted in September. If you keep off the frost it will flower in May following.

Pinks. They are perennial-flowers, most of which you sow in April in light earth, and transplant as soon as they are big enough. They flower the second year.

Martagon, or *Mountain-lilies*, of which are the white, the spotted, that of Canada, Martagon of Constantinople, red, and yellow, the Hungarian, the Virginian, and that of Pompey. They flower in June. They are propagated here by bulbs, as soon as the flower is gone, planting them immediately about five inches deep, in earth of strength and substance.

Honey-suckles. They grow commonly in woods, whence they are introduced into our gardens. Their increase is easy, for every branch will take root, if laid in the ground in January or February, if the weather permits. French honey-suckles are raised of seed in April, and transplanted as soon as they are fit.

Bugles. They are raised of seed. The flowers are used to garnish salads. To save the seed, cut down the stalks as soon as ever it begins to ripen.

FLOWER-GARDEN.—*June*.

FLOWERS blowing in this month, among others, are,

Snap-dragons. They are raised of seed in April, and the seeds are gathered in August.

Amaranthus's are sown every year, either on a hot-bed, about the end of March, or in light fat earth in May. There are several sorts and colours, but all flower from June till August. The seed is gathered from those raised on hot-beds and transplanted. It is a tender plant.

Convolvulus, major and minor, are annuals, and must be sown every year, in the latter end of March, or the beginning of April.

Nasturtiums are sown every year as other annuals.

Fraxinella is sown in light ground in August, or is planted from the roots in March. The seedlings you may transplant in April following.

Jessamine. Whereof are several sorts, the white, the Spanish, the yellow, and the Indian. They flower from July till the beginning of August. They are increased by suckers or slips, taken off in March and April. The Indian and Spanish must be put in pots or boxes, and housed in winter. These you graft by approach, laying the shortest branches in little channels in the earth · water them often, and they will take root the sooner, and be fit to be removed in September.

Carnations are increased by laying, thus first, you top the green leaves of the layers, then, from one of the middle joints, you cut it half through, to the next joint towards you; then, with hooked sticks, peg it down in the ground, covering it with mould, and then water it. This work is done from July to October. They will take root in a month after, and may be taken up and planted, either in beds or pots. They delight in light earth, one part of ox and cow dung, well rotted, mixt with two parts of earth, will be fit to plant your layers in. But the following composition is thought to be more excellent, viz. Take one barrow full of tanner's earth, four barrows full of woodpile earth, and a quarter of a peck of old lime, mixed and worked well together. The wet in winter is very hurtful to this flower Such as are planted in beds, ought to have the earth about them renewed every year Pigeons dung, or that of poultry, will make them blow the sooner. The seed of the best flowers sown in April, on a good shady ground, will produce very good flowers, and often a new variety of colours. Sow them thin, and lift the earth half an inch over them. The latter end of August, or the beginning of September following, you may transplant them, and expect flowers, if they like their soil, the summer after. The principal colours that blow are red and white, purple and white, crimson and white, scarlet and white, scarlet, and clove-gilliflowers.

Roses. Rose-trees increase by suckers, or laying in August. The roots are only pegged down in good earth. And likewise by inoculation in June. They are removed any time from October to February. Cut off all the dead branches every spring; and if you clip it, let it be as soon as it has done flowering. Roses thrive in most soils but in wet. They have various names, and are of different kinds, viz. The English rose, the Hungarian, the Belgic, the double velvet, the marbled, the Frankfort, the cinnamon, the damask, the Provence, the monthly, the yellow, the Austrian, the white, the musk, the eglantine, the evergreen, and double dog rose.

Campions are raised of seed sown in September, or of slips taken from the old roots in August, which you do every year afresh.

Poppies. They are of a vast variety, double and single, and, being one of the annuals, you sow them from the beginning of April to the end of May.

Marigold is likewise an annual, and must be raised by sowing its seed the beginning of April. There are several sorts, viz. the common, the African, and the French.

Fox-glove, or Digitalis, you raise by seed in April. The seedling-plant will be fit to be removed in September following. You may split the roots as you do carnations. You must frequently water them in hot weather.

Candy-tuft, common, dwarf, and French, is one of the annuals, and raised by seed sown in the beginning of April.

FLOWER-GARDEN.—*July.*

In this month bloom the following, viz.

Basil. The small kind is sown in March, on a hot-bed It is a tender plant, but a great ornament to a flower-garden, and requires great care to secure it from the weather. It is planted in pretty large pots of light rich earth.

Virgin's-bower is of two sorts, the red and the purple. They are increased by laying.

Lupines are annuals, and sown in the beginning of April.

Scabius. There are three sorts, the white, red, and Indian. To procure seed, remove the plants in June, and they will flower early the next year. They all die after seeding.

Marvel of Peru. This flower dies every winter for the most part, and is raised by the seed on a hot-bed, the beginning of April, and is thence removed into rich earth. Take up the roots, and keep them dry in woollen rags till March. putting them in the ground, they will flower as usual.

Catchfly is one of the annuals, and sown in the beginning of April.

Lilies are of several sorts, and commonly multiplied by the bulbs, set in October. They thrive in most grounds.

Everlasting-peas. They may be sown any time from October to the end of May. You must support them with sticks.

Female Balsam is raised of seed, sown on a hot-bed in March. The plants must be well secured from the cold for six weeks, or longer, and then planted out amongst small flowers. It requires frequent watering.

Dittany is a hardy plant: you may increase it by the roots in March, or sow it in rich ground in September.

Scarlet Beans are sown in April or May, as kidney beans.

Oleander, or *rose-bay*, is propagated by laying in August. It must be taken great care of in winter, or housed.

Passion-flower is sown on an hot-bed in March. Cover the roots in winter from the frost. You may propagate them by the roots, by planting them in as much sun as possible.

Valerian, a perennial flower, is sown in rich earth in April, and transplanted as soon as big enough. They flower the second year.

Spiderwort is a hard plant, propagated by planting its roots in August.

Tuberoses are increased of offsets, planted in a warm soil, in April, or put in a pot, and set in a hot-bed in March. When you take them out of the hot-bed, and dry weather ensues, give them water every day about noon, after they have stood awhile in the sun. Tye gently the stalk to a stick to prevent its breaking off. You house it about Michaelmas.

FLOWER-GARDEN.—*August.*

SEVERAL of the preceding flowers are continuing to blossom, viz.

Carnations, pinks, female balsam, amaranthus, the Æthiopian star-flower, cyclamen, greater convolvulus of various kinds, everlasting peas and sweet-peas, tuberoses, lychnis's, African and French marigolds.

Sweet Sultan is one of the annuals, sown in the beginning of April. Annual-stocks, autumnal hyacinths, nasturtiums, spiderwort, lupines, jessamines.

Hollihocks, both double and single, of several colours They are sown in April.

Sun-flowers are likewise sown in the month of April.

FLOWER-GARDEN.—*September.*

FLOWERS in bloom in this month are the following, viz. Besides several of the preceding month, scabiusses, autumnal crocusses, autumnal hyacinths.

Lark-spurs, one of the annuals, sown in April, polyanthusses, double and single.

Moly. They are of several sorts: the Homer's-moly, the Indian, the Hungary, the serpent, the Spanish, the yellow, the Dioscorides-moly. You increase them by the bulbs, which you take up as soon as the stalks and leaves are withered.

Gurnsey-lily, must be planted in a warm, rich, sandy soil, and increased by its bulbs, or offsets.

Æthiopic Apples. They are sown on hot-beds, the latter end of March.

FLOWER-GARDEN.—*October.*

BESIDES most of such flowers as were in blossom the preceding month, we have in this but few others. Those of any show are the African and French marigolds, marvel of Peru, autumnal crocusses, yellow autumnal narcissus, stock gilliflowers, tuberoses, Guernsey-lily, amaranthus, sun flowers, and several others.

FLOWER-GARDEN.—*November.*

WE have now but few flowers in blossom in the open air, besides such as are remaining of the last month; and our time, therefore, must be employed in taking care of such as require shelter from the severity of the frost: we must cover our choice carnations, auriculas, anemonies, and hyacinths, and protect them from great rains, snow, and cold in mild weather and sun-shine you may expose them to the open air. You now turn up the mould or earth you intend for your flower-garden, that the frost may mellow it.

FLOWER-GARDEN.—*December.*

IF we have a few of any flowers in bloom in this month, they are the remains of the last; except it be (if the weather proves open), some single anemonies, polyanthusses, primroses, and snow-drops.

Having thus gone through the Flower-garden, we now shall take a transitory view, and inspect what is chiefly to be done in the Kitchen-garden.

THE

THE KITCHEN-GARDEN.

KITCHEN-GARDEN.—*January*.

In this month you must prepare your ground, so that it may be ready for sowing or planting all manner of spring-herbs.

If the weather permits, you may sow radishes, spinach, lettuces, and other salading; but if you are hindered by hard frosts, dung your ground; make hot-beds, on which you may raise some small salad-herbs; clean your seeds, get your tools in order, to be ready against the frost is gone.

In open weather, secure your celery from the frost, by raising the earth about it: at such times you may transplant some of your endive, in a warm soil, for seed.

If you have any cauliflower-plants under glasses, pull off the decayed leaves, for they are hurtful; and give them as much air in open weather as possible; the same you must observe if you have any cucumber-plants: but you must very carefully attend such nurseries, if you expect the advantage of an early produce. Thus, by your industry and care, you may raise various kinds of kitchen-herbs.

If the weather permits, transplant, the latter end of this month, cabbage-plants, and sow some spinach in the same ground. You may, at the same time, transplant leeks and cabbages, for seed.

Transplant endive, thrusting the plants deep, almost to the top, in the ground.

Look after snails, and other vermin, in private holes of walls, and under hedges; which will prevent their coming abroad when the weather grows mild and warm.

KITCHEN-

KITCHEN-GARDEN.—*February.*

THIS month requires the attention, care, and labour of a kitchen-gardener more than any other in the whole year. He now prepares his ground, and sows radishes, carrots, parsnips, onions, spinage, and cabbage-lettuce; which, if he intends to have several crops, he repeats to do, about a fortnight distance from one sowing to another.

Sow young salading in warm borders, under pales, walls, or hedges; and for fresh supplies, repeat sowing them once a fortnight.

Sow cauliflower-seed in moderate hot-beds.

Plant in this month, garlic, shalots, rocambole, onions, sugar-loaf cabbages, cauliflower-plants from winter-beds, and artichoke stocks.

Sow beans and pease every fortnight, especially the Windsor beans: transplant cucumber and melon-plants of last month; plant kidney-beans; and, if the weather be favourable towards the end of this month, plant Silesia and imperial lettuces from the hot-beds.

You may also, about this time, sow cabbages and savoys for winter; and, for a constant supply of salad-herbs, sow lettuces, cresses, mustard, rape, radishes, turnips, &c. on hot-beds.

Plant potatoes, and Jerusalem artichokes, about six or eight inches deep in the ground.

Transplant the cauliflower-plants from the shelter of the glass frames, leaving one or two; take care not to disturb the roots.

Hoe your pease and beans that have stood the winter.

KITCHEN-GARDEN.—*March.*

THE unsettled weather of this month requires a diligent attendance upon the hot-beds: you must therefore cover your glasses and beds, in frames, with mats, every night, but give them fresh air in the day-time.

You now sow cabbages, savoys, and red-cabbages, for winter.

Plant out your cauliflowers from the winter-beds, or those that were raised last month.

Continue to sow pease and beans.

Sow salad-herbs, radishes, and spinage, likewise, some celery-seed, parsnips, carrots, dill, parsley, sorrel, chervil, fennel, marigolds.

Slip and plant mint, penny-royal, camomile, savoury, sage, rosemary, lavender, wormwood, and most of such savoury plants.

Plant out you winter lettuce-plants, and sow fresh seed to succeed them: sow likewise some endive.

Plant new asparagus-beds, if the ground be dry, and hoe your spinage and radishes.

In the beginning of this month sow cucumbers, melons, purslain, &c.—In the latter end, put in some kidney-beans, in warm borders, when the weather is fair and dry.

You likewise sow sweet marjoram, thyme, hyssop, &c.

Continue to sow young salading upon warm borders, until the beginning of April.

Sow all sorts of rounceval and grey-pease, for a full crop in the open field.

KITCHEN-GARDEN.—*April.*

THE beginning of this month plant kidney-beans in a warm and dry situation. Hoe your radishes, carrots, parsnips, onions, leeks, &c. and thin them to proper distances, clearing the weeds from among them, it will be a means to promote their growth.

In damp weather, plant slips of sage, rosemary, rue, lavender, and such sort of plants. Plant garden-beans, and sow marrow-fat and other large pease, to succeed the former.

Slip and plant artichokes and cauliflowers: continue to sow young salading in shady places; likewise Silesia and other lettuces: transplant young celery plants, about six inches distant, in a rich ground, watering them daily till they have taken root.

Hoe the ground between pease and beans, raising the earth up to their stems.

After a shower of rain, raise the earth round your cabbages and cauliflowers, which is necessary. If the night be cold, cover your glasses over the melons and early cucumbers. Keep your mint, parsley, &c. from weeds, and water them when the weather is dry.

Thin your cabbages and savoys, in order that they may receive strength before they are transplanted for good.

The latter end of this month draw out all the young plants of your artichokes, or else they will cause the main fruit to be small.

KITCHEN-GARDEN.—*May.*

Hot weather in this month causes a scarcity; but wet, a plenty of pease in our markets: but as wet weather gives plenty of pease, it also causes the plentiful growth of weeds, which you ought to keep under as much possible. The same is necessary with regard to dunghils, on which, if not destroyed, the weeds will shed their seed, and your garden will be plentifully stocked with them when carried there.

Continue to sow all sorts of small salads every week; for, in this season, they soon grow large. You may also plant beans, and sow pease, for another crop.

Plant likewise kidney-beans, on a moist soil; and, about the middle of this month, sow cauliflowers for winter, keeping the ground moist.

Plant likewise cabbages and savoys for the winter; and transplant celery into drills.

Clear the weeds from the cauliflowers and cabbages, and raise some earth about their stem, taking care none of the earth falls into the centre of the leaf.

You may now transplant radishes, for seed, but choose such as are strait, well-coloured, and small at top.

Shade your cucumbers and melons that are under frames. Hoe onions, carrots, leeks, parsnips, and beets, and clear them from weeds; it will promote their growth.

Transplant coss, imperial and Silesia lettuces, into north borders; and towards the end of the month sow some brown, Dutch, and common cabbage lettuces.

Cut off all small artichokes, or suckers, that grow up the side of the stems.

The latter end of this month sow brocoli for the spring; also set a latter crop of kidney-beans.

Sow cucumbers in an open ground, for pickling; plant gourds and pumpkins upon dunghils. Support the stems of your onions for seed; do the same to cabbages, carrots, parsnips, leeks, and others that were planted out for seed, and are now grown to some height, and want to be supported.

KITCHEN-GARDEN.—*June.*

With the beginning of this month you transplant cabbages and savoy plants for winter, either in an open spot of ground, or between rows of beans, cauliflowers, or the like; where they will sooner take root, and thrive best.

Those cauliflowers that were sown last month for winter, should now be planted out in beds of rich earth.

Hoe your carrots, parsnips, &c.

Plant out all sorts of sweet herbs that were sown in March, as thyme, sweet marjoram, &c. allowing them room enough to spread.

In the beginning of this month sow brocoli-seed for the second crop. Transplant celery into shady trenches for blanching; plant kidney-beans; sow brown, Dutch, and common cabbage-lettuces for a late crop, and transplant the lettuces soon in May.

Transplant endive for blanching in a moist ground.

Sow small salad-herbs every five or six days.

The brocoli which was sown in May, prick out into beds, about three inches distant from one another, and they will grow strong, to plant out the next month.

Weed and thin the plants in your cucumber holes, it will strengthen the rest; but do not let them want watering in a dry season.

Gather such seed-vessels as are ripe, in dry weather, and spread them in the sun to dry, on a cloth, or some paper, before you beat them out.

Such herbs as are now in flower, gather and hang up in a dry shady place, where they may dry leisurely.

Shade your melons from the heat of the day, with mats, and give them water but sparingly.

After rain, gather up snails; for then you may easily destroy them.

You may now transplant leeks from seed-beds to the place where they are to remain; and neglect not to water them till they have taken root.

KITCHEN-GARDEN.—*July*.

You may still continue sowing of salad-herbs for a fresh supply: hoe your pickling cucumbers, yet so as to leave a trench about them, to receive the water given them. Hoe likewise your cabbages, and clear the ground as much as you can from weeds.

The beginning of this month, you may sow the last crop of kidney-beans, where they may be defended from the morning frosts in autumn: the best sort is the large white; and the most hardy to stand the frost.

Sow spinage about the middle of the month for winter; likewise coleworts, carrots and onions, to stand the winter, and to be of use in the spring. For the same purpose transplant savoys, brocoli and cabbages; and plant out cauliflowers for the autumn.

Water your plants in dry weather, about evening; for if you do it in the morning, the sun will draw up the moisture before it penetrates to the roots.

To clear your dunghils from weeds is a thing very necessary to be done; for by that means you will prevent them from being brought into your garden.

Cut off those seed-vessels that are ripe, and lay them on a cloth, or paper, to dry, then put them up safe in a place where rats, mice, and other vermin can't come to destroy them.

Take up your onions, garlic, rocambole and shalots, when their leaves begin to wither, and spread them in a dry place to dry. Tie up full grown endive, to blanch it: this do in dry weather, otherwise the inside leaves will rot.

Pull up the stalks of beans, pease, &c. to prevent their harbouring vermin.

Give your melons but little water, lest it should render them insipid and watery.

Repair your asparagus-beds, by planting fresh plants in the room of decayed ones. Transplant celery that was sown in May, in order to strengthen them before they are set in drills.

Those artichokes that are fit to cut for use, you break off to the root, to preserve the stalk from injury.

Sow brocoli-seed for a latter crop; likewise endive, but the middle of this month, and the plants of it will [illegible]tinue till April.

KITCHEN-GARDEN.—*August.*

CONTINUE to take up onions, garlic, shalots, rocambole, and gather cabbage and cauliflower-seed. You may likewise gather the seeds of lettuces, radishes, &c. Pluck up strawberry-runners. Sow onions for spring-salads; likewise spinage of the prickly kind, for that will best stand the winter. This is likewise the best season to sow cabbages.

About the middle of the month sow cauliflower-seed for an early crop, to be planted under glasses. Sow cabbage-lettuce, and brown Dutch, in warm borders, to stand the winter. Sow likewise Silesia, cos, and other lettuces, to plant under glass frames, to be covered in winter for an early crop in the spring: all these seeds you sow in dry weather; and if the sun shines hot, cover them with mats, and water them regularly.

Transplant endive and celery for blanching; but water them duly in dry weather, till they have taken root.

Transplant some lettuces, sown in the preceding month, in a warm situation. The latter end of this month sow chervil, angelica, lovage, masterwort, scurvy-grass, fennel, alexanders, and others, this being the best time for their appearing in the spring.

Tie up your full-grown endive, to blanch.

Cut the small suckers from off the stalks of your artichokes that were planted last spring.

Transplant brocoli in rows, about two feet asunder, and water them till they have taken root.

You now look out and gather your pickling-cucumbers that are fit for your purpose, frequently.

Keep your winter-crops, as cabbages, beets, parsnips, &c. from weeds.

Clear your dunghils from weeds, and cast them at some distance, on a heap, to rot.

Plant

Plant slips of sage, rosemary, lavender, and the like plants; though the best time to do this is the spring.

Cut such herbs as are in flower, and you intend to dry for distilling, and hang them in a shady place; for if dried in the sun, they will lose their virtue.

Continue to sow salad-herbs every week. gather all sorts of kitchen-garden seeds that are ripe, and spread the husks upon mats to dry; and then lay up the seed. Guard your radish-seed in pods from being devoured by birds.

The latter end of this month is the best time to sow turnips.

KITCHEN-GARDEN.—*September.*

If you have sown any cauliflowers in the preceding month, prick the young plants upon an old cucumber-bed, in rows, about three inches distant from each other, and two inches asunder.

In case you intend to make mushroom-beds, take dung of three weeks or a month old, and lay the spawn to dry, for three or four days, in a shady place, before you put it in the bed.

Hoe your turnips and spinage which was sown last month in dry weather; and weed likewise your beds of onions, carrots, cabbage and coleworts. Raise the earth about your celery.

Continue to sow small salad-herbs in a warmer situation. Gather all seeds that are ripe. In moist weather, transplant your colewort-plants sowed in July; and the cabbage-plants sowed in August.

Continue to keep your late crops clear from weeds.

The latter end of the month transplant lettuces of several sorts, in warm borders, to cabbage early in the spring.

Cut down the haulm of asparagus which begins to wither, and clear the weeds from the beds.

If the season should happen to be rainy, protect your cauliflower-plants from it.

You may, at the end of this month, sow some pease in warm borders.

Transplant the last crop of brocoli, and draw earth to all the rest of such crops as you intend to guard against the inclemency of the winter weather.

KITCHEN-GARDEN.—*October*.

What work you have left undone the latter end of last month, you must not neglect to do in the beginning of this.

Plant beans, and sow pease, in a warm situation. About the middle of this month, transplant cauliflowers under frames and glasses, to abide the winter.

The cabbage-plants sown in August transplant in warm places, lest those planted for good in open ground should be destroyed by the frost. Your Welch onions will resist the frost better than the common sort, therefore keep them clear from weeds.

You may sow all sorts of salad-seeds upon moderate hot-beds, and cover them with mats, lest the cold weather destroy them when they begin to appear above the ground.

Plant out your colewort plants lately sown, to succeed those that were planted out the former month.

Cut down your artichoke stems even to the ground, and lay earth over the roots, to protect them from the frost.

Sow radishes upon warm borders, for the spring.

Your mushroom-beds must be covered, either with frames and glasses, or with thatch, to prevent the wet soaking into the beds, which would destroy them.

KITCHEN-GARDEN.—*November*.

Neglect not, in the beginning of this month, to finish what was left undone in the last.

Give your cauliflower and lettuce-plants, under glasses, as much air as you can in dry weather; and even in moist weather you should let them have a little air.

Plant beans, and sow pease, in dry weather, to succeed those planted in the preceding month.

Sow salad-herbs upon moderate hot-beds, as lettuce, cresses, mustard, &c. for a constant supply.

Dung and trench the ground designed for early crops, laying it in ridges, to rot and mellow, till you have occasion to make use of it.

Sow, on warm borders, some carrots and radishes, the middle of this month. Keep your onions, spinage, and other crops, sown in July and August, clear from weeds.

Pick the decayed leaves from your cauliflower-plants, and raise the earth about the stems of those under glasses Be careful to let no earth come into the heart of the plants, for that will spoil them.

Take up the roots of carrots, parsnips, potatoes, &c by the end of this month, and keep them in places secure from frost.

KITCHEN-GARDEN.--*December.*

THE changeableness of weather, of frosts and rains, in this month, is very hurtful to tender plants.

If the season be mild, bury some rotten dung about the ground of your artichokes, which will promote their growth in the spring.

Carry dung into your kitchen-garden, and spread it, trench the quarters, and lay the earth in ridges, to be mellowed by the frost: this will save a great deal of labour in the spring.

Search the lurking-places of snails under pales, hedges, broken pots, or rubbish, and destroy them before they come abroad.

Sow salad-herbs upon a moderate hot-bed, under frames and glasses, or arched with hoops covered with mats.

Take endive in a dry day, hang it up for two or three days, for the moisture to dry from between the leaves; and then lay it on ridges, on a dry spot of ground, almost to the top of the plants.

Cabbages and savoys, designed for seed, you take up and hang in a dry room, by their stalks, for eight or ten days, to drain them from moisture; then plant them, almost over their heads, in warm borders.

PART VIII.

OPTICAL EXPERIMENTS;

BY MEANS OF WHICH THE MOST SURPRISING PERFORMANCES ARE EXHIBITED, FOR THE ENTERTAINMENT OF THE CURIOUS.

TRANSLATED FROM THE HIGH-DUTCH.

INTRODUCTION.

THE German author intimates in his preface, that he is the sole inventor of these optical experiments; and that none of them have ever been treated of before by any other: but whether this is fact, must be left to be determined by gentlemen of experience. He appears to be a man that has applied himself chiefly to the study of the Mathematics, particularly in that branch relating to Optics; by the practice of which, and the teaching that science to others, he confesses he gets his livelihood. As the subjects contained in this little treatise are of a curious nature, I thought fit to give the public, especially all lovers of optical experiments, a translation. Although I am but little qualified for the task, yet I will attempt to perform it to the best of my capacity, not doubting but the courteous reader will overlook such faults as he may discover, both with respect to technical terms, as well as of the style of the subject. The author himself, in the original is very dark and difficult to be understood, but I have kept up to his sense, as near as possible; and have endeavoured to make the English translation more plain and intelligible than the original High Dutch.

How to make a Camera Obscura.

CAUSE a box to be made, *fig.* 1, *plate* XIX. square at bottom, running up tapering like a truncated pyramid, on the top of which place another square box, so as to take it off, or on, at pleasure. In this small box put a looking-glass, in an oblique position, higher or lower, according as the object requires. The front and the bottom of this box is to be open, for the first to receive the objects on the looking-glass, and the other to fling the radius through the glass *a*, which is fixed in a tube to the upper part or covering of the lower box: this tube must be about four inches long: at the bottom of this box you put a white paper, on which, by looking through the opening *b*, are seen the objects without, represented in their natural colours on the paper.

Anoth

Another Camera Obscura.

MAKE a square box, as *fig.* 2, *plate* XIX. with a tube and glass *a*, fronting which you place a looking-glass *b*; over it is a rough-ground glass, on which the objects from without are represented through the tube *a*, provided it is covered over with a cloak, or darkened with any other covering: the focus of this glass, which must be left uncovered, may require the length of about two feet, but that of the former, three or four.

How to discover various Images in a Vessel full of Water.

AFTER the above manner we may make a Camera Obscura in a vessel of wood, or of any other matter, the glass *c*, *fig.* 3, *plate* XIX. being well fixed and luted, so as to bear the water: the box being filled, the images or figures will appear on the surface.

With this machine many credulous and ignorant people have been deceived and imposed upon, by the cunning men and women called fortune-tellers; who make them believe they see the spirits or apparitions of their relations, friends, or any others they are minded to see.—Those conjurers cause the lens, with the tube *a*, to go through a hole in the wall, where, at a convenient distance, they place either a male or female, in a ghastly attire, as requisite, before it: in the room, round the machine, they draw a ring, or conjuring circle, with strange characters, in which none of those that come to have their fortunes told, must, upon their peril, presume to enter; this they do to prevent their seeing the glass bottom *c*, on which the images, that are without, are represented. The conjurer then calls for clear water, which being brought, he or she pours it into the vessel up to the brim;

when the enquirers are admitted to look and see the representation on the surface of the water.

Another conjuring Secret, to deceive the Ignorant; viz. to represent a Figure as though it was alive, in a Glass Globe; or to shew a Man in a Bottle.

THIS is done by means of three glass globes filled with water, *fig.* 4, *plate* XIX; they are placed at certain distances from one another, according as you see convenient in trying the experiment: the glass or bottle *c* must be enclosed within the wall of the room, to prevent the other two being seen. A person is placed before the two glasses without, at a proper distance, and his shape, motion, and activity are represented in the globe within, as really alive, though but small. He will sing a song, play upon the flute, violin, or harp, and perform many other exercises.

To represent all Manner of Apparitions in a Dark Room.

YOU make in the window-frame a round hole, with a well polished lens fixed into it: before the lens, a little farther than the distance of the focus thereof, you hang, horizontally, by a thread, a cross made of some slight sticks; to the ends of which you hang figures of men, beasts, birds, or any thing else, with their feet uppermost. These things must be painted on, and shaped of, isinglass. The cross being turned round, the figures will appear in motion in the chamber. *See fig.* 5, *plate* XIX.

To represent a Man with Four Legs, without a Head.

PREPARE a looking-glass with a black ground, and place it to the inside of a door, so as to flap up and down: at *a* is a hole in the door below the looking-glass; in *c* stands a person: the looking-glass is placed so that one half of the body of the person is seen in the glass, and the other half without it; you then will observe the lower part turned up in the glass, and consequently the two natural feet below, and two others at top, with the body in the middle. *See fig.* 6, *plate* XIX.

To represent a living Man, in a private Room, holding his Head upon the Point of a Sword.

To facilitate this you have a glass ground like that at *fig.* 7, *plate* XIX. of a flint, cut; this you place in a tapering tube at *b*, and fix the same in a round hole in the door, with the side *a* towards the floor; opposite this glass, place a man with a sword in his hand; then looking through the tube *c*, which is without the door, you move it higher or lower, till you find the head separated from the body; this being accomplished, fix the tube steady, and stepping into the room, mark the place the person stands on, or cause it to be marked by the person himself, or any body else, that you may repeat the experiment another time without much trouble. Cause the person to make several motions with the sword in his hand, sometimes higher or lower, first on one side, and then on the other, till the head seems to be fixed on the point. Then, the person holding his hand steady in that position, such as before were unacquainted with the mystery, looking through the tube, will be surprized at so shocking a sight.

To prepare a Mirror, wherein may be seen various Appearances in the open Air.

You grind, or cause to be ground, a glass, *a*, *fig.* 9, *plate* XIX. which on one side is convex, but plain on the other; the focus whereof may be about twelve, but the magnitude four, five, or more, inches; the larger it is, the better: this glass is fixed in a door, *b*, in such a manner, that the flat side be towards an open field, before a town, city, or some country-house or other, which may represent itself in the mirror *a*, as doth the landscape and house *c* in the mirror *a*: behind the mirror, by *d*, about the distance of the focus thereof, you place a wooden board, on which is painted, in lively colours, on a black ground, either a man, bird, star, letters of gold, or whatever else you think proper; the glass will magnify them, and, looking into it, will appear as though they were in the open air; and by a motion given to the board, the figures painted on it will seem to fly over the trees and houses. You must give the figures a strong light.

How one may see the Appearance of Persons or Things in an empty Room.

You conceal near the door a *Polemoscope*, *fig.* 8, *plate* XIX. (which is an oblique perspective glass, contrived to see objects that are not directly before the eyes) or a tube with two looking-glasses, contrived so that the one end *e* may reach into an upper room; then looking into the lower room at *d*, one shall see all that is done in the upper room, in the lower looking-glass of the tube.

The *Polemoscope* is commonly made in the shape of a perspective, or spying-glass; instead of the object-glass is placed a looking-glass, in an oblique position, to receive the objects in the upper room, and to convey them through the other end of the tube, where likewise is a looking-glass, by which, through an orifice, we see below the things that are transacted above.

A Picture against a white Wall.

In trying this experiment, you darken the apartment, leaving only an opening in a window for a box *a*, *fig.* 10, *plate*

plate XIX. to be put in. This box is of a square form; the two sides, with top and bottom, are close; the back part, which must be towards, or without, the window, contains a picture of a landscape, painted with the most lively transparent colours, on the finest post-paper, strained on a frame *b*, and fixed close to the box. In the fore-part is a lens *c*, of about two or more inches diameter; the focus whereof must be something shorter than the box, through which the picture of the landscape will be represented against the opposite wall *d*.

A Person in a Room apparently to sink down in the Ground.

THIS is done according to the direction given in *fig.* 7, by means of the same glass, with only this difference, that the side *b* is towards the floor: direct the tube with the glass so, till you can see no more of the feet of the person in the room; when then the person sits down, he will vanish from the spectators' eyes, and, in appearance, sink into the ground.

For a Person in a Room to appear and vanish in an Instant.

THIS is likewise done by the same glass and tube as the former, with this difference, that the side *c* is directed towards the floor, and the edged side *a* is changed for that of *b*; the person walking in the room, passing and repassing by the glass, will suddenly appear, and as suddenly again vanish.

To see nothing else of a Person in a Room but his Hand.

A PERSON disappearing, in the manner as has been said before, by stretching out his hand toward the middle of the glass, the spectator shall observe the appearance of nothing but a hand.

To cause a Man in a Room to appear with Three Heads.

For the performance of this, is required a glass ground with three flats or faces: it is fixed in a door, as that of *fig.* 7, but the vacancy, or frame of the tube, must not be quite filled up, but only the third part from the top, with the side *a* towards the floor. The person then is to be placed at a proper distance from the glass, as will seem requisite, and the trying of the experiment will itself direct. *See fig.* A.

To cause the Appearance of a Man with an Ass's, Stag's, or any other, Head.

This is done with the glass *fig.* 7. by directing it, first, so as to see the man without a head; then, causing a painted ass's or stag's head to be hung over the same person, at the distance and situation taught by trying the experiment.

To represent Men and Women in a Room, in the Shape of Dwarfs.

This is likewise done with the glass *fig.* 7. of which only one half is to be seen; the lower part of the opening is left empty. The side *a* is directed towards the floor, and pretty near the middle of the opening, so that the persons in the room are seen half way, or the upper part, through the glass, and the other half, or lower part, without the glass. The upper face of the glass *b* must be covered over, or else the persons will appear double. The different placing of this glass will produce divers other representations. This experiment is one of the most curious and the most diverting of any; the more, as several persons may place themselves before the glass.

A Perspective, through which any one may have a view of strange Landscapes.

TAKE a common perspective or spying-glass, at the end whereof, where the object-glass is, place a looking-glass, in an oblique angle, directed towards a painted landscape; then, looking through the lens on the other side, you shall see nothing else but the landscape the looking-glass is directed to. You must, according as the nature of the distance of the object requires, draw the perspective farther out, or shorten it.

To see the Appearance of a Person flying in the open Air.

ERECT, on a little shelf fastened to the window-frame, a looking-glass *a b. fig.* 11. *plate* XIX. which may be moved sideways. On one side of the glass, on an eminence, which cannot be seen through the window, stands a person in an open field, so that, behind, his back is against a white wall, or where nothing is seen but the heavens about him: scrape the quicksilver from behind the looking-glass, leaving only a little spot, in which the person is represented: erect the glass so as the person may, from the window, be seen in the spot; then, looking through the hole A, you shall see the objects all round that are before the window, and in the spot you shall see the person. The glass being put in motion, he or she will seem to fly in the air; but this must be managed so dexterously as to bring no other objects in the glass besides the man.

To represent a Sun-Dial in one's Chamber.

PREPARE a square tube, and form the lower end in the nature of a chimney, the top reaching above the roof of the house, on which you fix a square glass, ground, but not polished, with the figures, and gnomon, or stile, of a sun-dial. At the bottom of the tube you place a polished looking-glass, elevated about thirty-nine degrees, wherein you will see the sun-dial which is a-top, shewing the hours of the day. You may magnify this dial below by putting magnifying-glasses between both.

To make a Candle, the Flame whereof shall not hurt one's Finger.

FOR this you make use of a glass cylinder or tube, which is of an equal roundness, about three or four inches diameter. The outside of the cylinder you paint all over with an oil-colour black. Then putting into it, at the bottom end, a short piece of lighted candle, the flame will appear a-top of the cylinder, in which you may hold your finger without hurt.

A Solar Microscope, to represent a minute Object magnified.

ERECT, in a window towards the sun, a little movable shelf, so as it may be turned fronting that luminary. On this shelf place the object *a* and a small round looking-glass *b*, in order the more to illuminate the minute object. Within the board is a lens, through which the object is represented, with all its colours, upon a white sheet of paper. The room in which this is performed must be darkened, save only the lens. *See fig.* 12, *pl.* XIX.

To

To see the Representation of a living Man on the Top of a high Steeple.

BEFORE a window-frame fasten a shelf *b*, (*See fig.* 13, *pl.* XIX.) on which place a looking-glass, cleared at the back of the quicksilver, to only a small spot, in the same manner as has been mentioned before in *fig.* 11. In this spot the person is to be represented on the steeple. The person stands on one side, either against a white wall, or in the open field, where his body is to be free, with his feet above the horizon; and, having the glass so moved as to take the object on the spot, direct the whole glass so as for the spot to go in a direct line to the top of the steeple; then, looking through the little hole *a*, you will see the person by a radiant reflection on the top thereof, which is surprizing for such as are unacquainted with the secret.

A Rope-Dancer in a Box.

YOU place in a window that goes out of one room into another, a box, on the one side of which, towards the eye, is an oil-paper, and on the other a polished lens; in short, it is a *camera-obscura* with a lens, but no looking-glass. In the adjoining apartment must be placed a bench opposite the lens, on which a person may exhibit several postures and motions, which upon the oil-paper will appear as though he was dancing on a rope.

A Rope-dancer between two Steeples.

To exhibit this, you erect a looking-glass before the window, in the same manner as has been taught in *fig.* 11 and *fig.* 13. but, instead of a living man, you make use of a little figure carved in wood, and fixed seated on a cord, which is tied to two sticks, in such a manner that each end is directed to two different steeples; and the figure being put in various motions by a horse-hair, the cord will seem to reach from one steeple to another, and the little figure to make his turnings and postures upon it.

A Play represented on a Paper by Shadows.

FOR this are required three large lens-glasses, each of about six inches diameter, their focus to be twelve inches. They are fixed in a tube; the first two have the distance of their focus; that towards the object must be something further, as by experiment you will be taught. If in an adjoining room a company is merry, dancing, or acting a play, you will see all the actions upon an oil-paper that is fixt in a frame in the wainscot, or partition, towards which the glasses of the tube are directed. *See fig.* 14, *pl.* XIX.

To make a Dioptrical Chest, at a small Expence, wherein may be exhibited Landscapes and Perspectives.

TAKE a piece of a hollow glass globe; (the best are the broken recipients made use of by apothecaries or chemists) pour into it some water; then, laying a picture on the ground, hold the glass with the water over it, raising it higher or lower, till you find the picture represented the largest, without confusion; this must be the height of your chest. For that purpose, when you give orders for making this chest, cause two rolls to be made, about which are rolled pictures of towns, and landscapes, leaving an opening in the box to be illuminated; over it place the glass with water, which must have a rim for to confine it; and you will see the pictures appear in such a manner as though you were looking in a large field. *See fig.* 15, *plate* XIX.

CON-

Concluding Observations concerning Optic, or Perspective Glasses.

OPTIC or perspective glasses are either convex or concave, the concave draw the objects near, but lessen them, the convex magnify, when the distance of the glass is further from the eye than the focus. The smaller a focus of a glass is, the more it magnifies. The focus of a glass is that point in which all the rays unite, as in a burning-glass. that point where the sun burns the strongest, is the focus of the glass. You may find the focus of a glass by holding it facing the window against a white wall, when the window will be clearly represented thereon the distance then from the glass to the wall is the focus. The convex glasses have also this property, viz. to represent the object that has been observed about the window, as if towards them. A glass, whose focus is large, represents the object far off, but such as have a short, or small, focus, shew the objects near behind them.

A glass less elevated has a larger and longer focus, but if more, a short one. A glass with a large or long focus forms a large, and such as has a small or short focus, a small image; hence the long spying-glasses shew the objects larger than the short ones, because the first glass towards the object forms a large image, which is by the eye-glass more magnified. If we take an eye-glass of a short focus, the object will be large, if a less, or of a less focus, the object will be larger still, but more obscure, because the object-glass causes a certain number of rays of light to enter the tube, which are dispersed by the eye glass, and thereby magnified, so that the rays of light are the more dispersed, and the object appears more obscure, for which reason, a medium is to be observed. It may be argued that one may cause more rays of light to enter the object glass, by making a larger orifice, to which it must be replied, that the rays which are towards the rim of a glass are shorter than those towards the centre, and therefore form a confused image, when the short and long rays come to meet, or be mixt together.

There is another property belonging to glasses, viz. they form objects subverted, or turned upside down, which cannot be replaced right but by placing another glass behind. Glasses form no image, except the object is further than the distance of their focus. If the distance is twice the length of the focus, it will represent itself in twice the distance towards the glass, if the object be further distant, the image will be brought nearer behind the glass; but if the object be nearer than the double distance, it will still be further represented behind the glass. We must imagine the convex glasses to be a piece of a globe. A glass on one side convex, and on the other plain, has its focus twice the length of one that is convex on both sides. In this short lesson is contained the theory of perspective glasses. Such as are studious may read books that treat more at large

PART IX.

THE
ART OF DISTILLING;

AS PRACTISED IN HOLLAND.

TRANSLATED FROM THE HIGH DUTCH.

Of Distilling in General.

DISTILLING is an art by which the principles of a mixt body, as the water, oil, spirit, &c. are drawn off into proper vessels, by means of fire.

The ingredients subject to be distilled are blossoms, fruit, aromatic vegetables, spices and seeds.

The colour, flavour, and scent are drawn from blossoms, as are simple waters and essences.

Out of fruit are drawn the colour and taste.

From aromatic vegetables are extracted pure spirits, essence, sweet-scented liquors, and simple waters. They are distilled in two ways, viz. with water, or with spirit.

Out of spices are drawn the essences, or oils, together with their odour, and likewise spirits.

Out of seeds are distilled simple waters, spirits, and oil, as out of anise and fennel seeds, and juniper-berries.

The colour of blossoms is extracted by infusion, or by digesting them in brandy, or spirits of wine. The odour or scent is drawn out by the distillation of the water, as likewise by distilling them with brandy, or other spirituous liquors.

The colour which is extracted by infusing blossoms in water, set over a fire, or by digestion in brandy, or spirits of wine, is called a tincture of such blossoms.

The colour of fruit is in like manner extracted by infusion or distillation: as is the taste by infusion and digestion; but in this operation we must be very careful with respect to time, else, in case the fruit is in fermentation, the juice of it will turn sour.

What is brought over by distillation, is either spirit, essence, simple water, or phlegm.

Spirit is the first principal in the art of distilling. Most bodies contain spirit in a more or less degree within themselves.

By essence we understand, in distillation, the oily particles of a body. In all distillations, except spirits of wine, we shall perceive a subtile oily substance, which being extracted, is the balsamic part of any thing separated from the thicker matter.

Simple water is distilled out of blossoms and other vegetables, without water, brandy, or spirits of wine, and retains the scent in as much perfection as the body it is extracted from.

Phlegm is the aqueous part. Every distiller should be well acquainted with its nature, though there are many that are deceived in it: they take the white and cloudy drops, that precipitate first, when the ingredients in the still begin to be drawn over, for the phlegm, which frequently is the most spirituous, though they fling it away.

That whitish and cloudy matter proceeds from not having the still well wiped from its dampness, else the first drops that are drawn over would be as transparent and clear as the last.

The following remarks deserve our attention. Of such materials as are in digestion, the spirits rise first up to the helm, but of ingredients which have not stood in digestion, the phlegm rises before the spirit.

In case we intend, therefore, to extract the essence of any ingredients, we must first prepare them by digestion.

Every blossom requires its proper season for distilling. We shall here begin with violets. The scent and colour of them ought not to be extracted but in time of their maturity, which is generally in the month of April, when in full bloom, and the virtue strongest.

As with violets, so with other blossoms, they must be gathered in their prime, and in the warmest weather of the season they blow in, when they retain the strongest effluvia.

The same must be observed with respect to fruit, which ought to be the finest and best tinctured, and in their beauty.

Seeds and spices may be distilled at any season of the year They require chiefly a judicious choice.

Nothing is so fine as the first distilled liquor, when the process is conducted with care, but the syrup and the colours cause it to be dark and cloudy, to remedy which, we must filtre it thro' sand, or brown paper, or a filtering bag. We may also do it by putting cotton-wool in a funnel, and pouring the water through. The funnel must have a covering, to prevent the exhalation.

Fermentation, or digestion, is, when an inward motion is produced, whence proceeds a new combination and union of the parts

The

The Manner of distilling Brandy, and other Liquors.

BRANDY is the foundation of all the operations in distilling. If we intend to distil brandy, it will be necessary for us to inspect and examine the still, and be satisfied that every part is tight and secure, to prevent the steam from penetrating through. If the still is new, we ought to boil water in it, to season it, and to prevent the ill taste of the brandy, which otherwise it would contract from the tinning; if not new, it requires to be well washed, and cleaned with fair water. The still being thus cleaned, and dry, you fill it about two thirds with wine, then putting on the helm, you lute it very close round, fixing the recipient to the nose of it. Being provided with water and wet linen rags for cooling the helm, you make first a large fire, in order to make it boil, and, by degrees, you lessen it, to prevent any accident that might be occasioned by too much heat. The first extraction will shew what sort of brandy the wine has produced, and what quantity of wine you are to supply the second distillation with.

Mealy seeds are in like manner fit for distilling of brandy. The most in vogue are wheat, rye, and other grain; also juniper-berries, &c.

If you intend to distil brandy from grain, you first moisten it several times, in order to bring it to swell*, after which you spread it out to dry; when dry, it is carried to the malt-mill, from whence, after it is ground, you put it in a mash-tub, pouring thereon water, which two or three days before has been boiled, and before long it will begin to work. After this mixture has received a spirituous strength, you distil brandy off it.

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[*] This alludes to the process of *malting*, which is better known in England than in Holland.—H.

You may distil brandy off all manner of fruits; if first you half mash them in pieces, and then put the liquor and all together into a tub: it will soon ferment, have a wineous quality, and be fit to distil brandy from.

In like manner you proceed with respect to juniper-berries. You first bruise and soak them with water, to bring them to ferment. When you have brought this to its proper degree, you press the mash, and from the liquor you distil *Geneva*.

You may also distil brandy from sweet wort, or beer.

Common spirit of wine is that which is extracted or brought over by the first distillation, and separated from the phlegmatic parts. In case this is once or twice brought over the helm, and thereby freed from all its phlegm, then it is called rectified spirit of wine, which is the fundamental principle of all distilled liquors, and, as it is necessary to be well experienced with the management, a distiller should be attentive when the phlegm begins to rise, which he may perceive by the white colour which distinguishes it from spirits.

As the rectifying of spirits requires a great precaution, it will be proper to have the management briefly explained.

It has already been said, that the rectifying of spirits is nothing else but repeating the distillation. The first method is, when the spirit of wine is brought over, to draw off the remains, and pour the distilled liquor into it, with which you proceed in the same manner as before, and bring about half over the helm again. You then make trial, by burning a little of the liquid in a spoon; this done, you judge, from the remaining water, how far your spirit of wine is rectified. In case it has not arrived to its perfection, you repeat it once or twice, in the same manner, till you find it arrived to the desired degree.

The rectifying of spirits is the most dangerous operation in distilling of spirituous liquors, and requires great care in frequently cooling the ſhelm, so as to prevent that danger the neglect of it would produce.

In this manner, rectified spirits of wine is very clear, and is commonly made use of for cordials and odoriferous waters. The quickest way generally made use of is, to rectify the same over an open fire, but it is the most dangerous. The best, but the most tedious is, rectifying it through the serpentine cooler, or worm. The least dangerous is the method of doing it in *balneo mariæ.*

If you give the spirit the highest degree of perfection, you must set it in a close vessel, on a sand-heat. This is all we shall notice concerning rectifying of spirits.

The proofs which are made on rectified spirits are of various kinds; some judge it by the smell; others by rubbing between the palms of their hands, which turn dry immediately if the spirit is well rectified: others, again, dip cotton-wool, or paper, into it, and light it by a candle; in case the fire of the spirit burns the cotton, or paper, it is a sign of its perfection, but if, on the contrary, they take no fire, they conclude it has much phlegm.

Of the Knowledge and Choice of Blossoms, Fruits, and Aromatic Plants made use of in Distilling.

Of Blossoms.

THE distillers make use of blossoms on two accounts, viz. either to press out the tincture of them, as of violets, damask-roses, corn-flowers, saffron, hyacinths, pinks, &c. or to extract from them the volatile smell, as from the rose, carnation, jessamine, violet, jonquil: the blossoms of aromatic plants, as thyme, rosemary, basilic, spike-lavender, &c. or the blossoms of sweet-scented trees, as of lemon, orange, and others, are much used.

The distiller ought to know the choice of blossoms, and to make use of them only in their prime, and the time in which they have their full strength. The general rule is to gather them always before sun-rising, whilst the cool of the morning prevents their volatile scent from dispersing.

The fruits made use of by distillers are of several kinds, lemons, oranges, golden-runnets, muscatel pears, and quinces. From the quinces, which are fit to ferment, we may distil a spirituous water, which is very good to mix with other liquors; partaking of the fine flavour of that fruit, and contracting medicinal virtues for the stomach. This fruit is principally made use of for ratifies; also for double ratifies, which, after it has stood for some time, come to perfection we little imagine.

Cherries, plumbs, and apricots, are made use of in ratifies these three sorts are infused in brandy. Distillers use other fruits to ratifies, as strawberries, raspberries, mulberries, &c.

Kernels of nuts are also used in distilling. those for ratifia are infused in brandy, when young. Bitter almonds serve the same purpose, as well for extracting oil from them, as for odoriferous essences.

Aromatic plants are those whose stalks and blossoms have a penetrating yet pleasing odour. These plants retain their scent for a long time after they are gathered, nay, even after they are dried. We may extract from them odoriferous waters, that are very comforting to the heart and brain, and are commonly made use of in faintings. A quintessence is likewise extracted from them, which is used instead of the plant, when that cannot be had.

The aromatic plants are distilled two manner of ways, either with water, to distil simple waters, or with spirits of wine, to make sweet-scented waters. Both are very salutary, and good for the body.

Spice is frequently made use of by distillers in their business, and therefore they ought to be well acquainted. Such as are most in vogue are cloves, cinnamon, nutmegs, and mace. Out of these four sorts are extracted, by distillation, tinctures by infusion, and likewise oil, as shall be specified hereafter.

Seeds, for the generality made use of in distilling are, anise, fennel, angelica, coriander, dill, celery, parsley; of these are drawn the spirits, with brandy, and are well tasted liquors.

Coffee is of an excellent quality, of which more shall be said hereafter.

Of Oranges.

The orange-tree* is well known, and the culture is brought to great perfection, considering the difference of its natural climate in Provence and Languedoc. The blossoms of this tree* are white, soft, and of a pleasant penetrating flavour, in taste, and smell.

To distil single Orange-water.

Take fresh orange blossoms, gathered after sun-rising, and put the leaves and hearts of them into the still. Put a brisk fire under it, because it is not distilled with brandy or spirits: the water being heavy, requires a fiercer fire to cause it to ascend. Care must be taken in bringing over the water, for the blossoms will be apt to stick to the bottom, and burn-to, and spoil that which is brought over. Keep cool your worm, and you will have a good water.

RECIPE.

Take one pound of orange blossoms, four quarts of water, and bring over the helm three quarts. Or,

Take one pound of orange blossoms, three quarts of water, and draw over two quarts and a quartern, at most.

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* These blossoms, boiled in ordinary syrup, make the capillaire of the shops.—*Ed.*

Double distilled Orange-water.

THIS is distilled in *balneo mariæ*. You put, according to what quantity of water you intend to make, orange blossoms into the still; and having placed it over the fire, you draw over the flavour from the blossoms—and this is called double distilled orange-water.

With the double distilled orange-water you will have the quintessence, which is the oily part that swims on the surface. The quintessence is at first of a green colour, but changes in a few days into a reddish colour.

In order to part this from the water, you turn it in a bottle, when the double distilled water will come out first, and the quintessence remain to the last. The water is excellent: a few drops mixt with such things as we would have the scent of, are sufficient, but the quintessence is much stronger.

Receipt for the double distilled Orange-water.

PUT orange blossoms, in your vessel or cucurbit, about half full. In case you will have the water good, draw off no more than the third part, if the blossoms are substantial if not, draw off less. This depends on the quantity of water, the fierceness of the fire, and the goodness of the blossoms.

Receipt for Quintessence of Oranges.

IN order to make a certain quantity of quintessence of orange blossoms, you must put your double distilled water in your vessel or cucurbit, and fresh orange blossoms, and, having luted it close and secure, you distil it in *balneo mariæ* (which is the most secure), or with a sand-heat.

To

To make a Spirituous Liquor of Orange-flowers.

To do this, you dissolve sugar in cold water, put into it double distilled orange-water, and spirits of wine, mix all well together, and pour it through a filtering-bag. Your liquor being clear, it will be ready.

You may, if you will, make use of quintessence, which, together with double distilled orange-water and brandy, you put in, and distil over, the spirit being brought over, they are mixt with treacle, and cleared through a filtering-bag.

RECEIPT.

For six quarts of orange-liquor, put three quarts of brandy, three quarts of water, and half a quartern of orange blossom-water into it.

If you make use of quintessence, put, to each quart, twenty drops, into three quarts and half a quartern of brandy, and after that, three quarts and half a quartern of water, with one pound of sugar.

Of Roses.

Roses are divided in two principal kinds, namely, the wild or dog-roses, and the garden-roses.

The wild-roses are single, and of less scent than the pale garden-roses, yet more than the red roses.

The garden-roses are the single, the carnation coloured, the common white roses, the musk-roses, and the red roses.

The pale single roses have more odour than the carnation roses, because the strength is in fewer leaves, and on that account are the most used in distilling.

The common white roses are good for distilling. The red roses, and the *Provence*-rose, are fittest for physic, and for pressing out fine tinctures.

You must not gather them in wet weather, because the water will deprive them of some part of their virtue.

For distilling of simple rose-water, you take only the leaves and stamp them; and having put them into the still or cucurbit, you distil them in *balneo mariæ*.

In order to make it sweet-scented, you must distil it over again; adding fresh leaves to it, prepared in the same manner as for the first distillation.

To extract the Quintessence out of Roses.

TAKE garden-roses, fresh gathered after sun-rising: make use of a cucurbit, which (stratum super stratum of salt and leaves) fill about half up the belly, and having pressed them down, put on the helm: lute it close, stop up the nose of the helm, and so let it stand for two days.

The first running you throw away, because it is the phlegm; after which, you lute the receiver again to the nose of the helm; the next running will be a double distilled rose-water, and the quintessence; which last you separate from the water, as has been taught.

The quintessence of roses is not much known, nor in fashion; but in case it should once be introduced into fashion, it would be of long duration. The excellency of roses is too well known to admit a doubt of the successful distilling the quintessence: and he who shall be so happy as to arrive at perfection, will not fail of meeting with advantage and credit.

Of the Lily.

THERE are two sorts of lilies, the one which has a white, and the other a yellow, flower.

Lilies are of great use to perfumers, among their powders, oils, and cosmetics. The distillers make a liquor, a simple water, a double water, and a quintessence from them.

To make a Liquor, called Lily-brandy.

TAKE fine, fresh, thick, and full-blown lilies, gathered after sun-rising. Nothing is flung away but the stalk. Put the flowers whole in the still, pouring on them water and brandy; and having put on the helm, and luted the same carefully, distil it with a pretty strong and open fire.

Your spirits being drawn over, dissolve sugar in water; mix it with the spirit of lilies, clear it through a filtering-bag, and your liquor is done.

RECEIPT.

TAKE, to five quarts of liquor, half a pound of lilies, and three quarts of brandy, for the syrup, one pound of sugar, and three quarts of water. In doing more or less, you must observe a true proportion.

For double distilled Lily-water.

TAKE four quarts of the above liquor, half a pound of lilies, three quarts of brandy, three pounds of sugar for the syrup, and two quarts of water.

For simple and double Lily-water.

To the simple lily-water take good blossoms, gather them as has been observed before, put them into a still, and pour water on them.

Distil your ingredients with an open and pretty strong fire, because the water ascends heavier than the spirit. Be careful not to bring over too much, lest the flowers should burn-to, and spoil all; nor too little, lest you wrong yourself. Cool the still, in order to preserve the scent of the lilies in the water.

RECEIPT.

To three quarts of water take one pound of lilies, or in proportion, if you intend to distil a larger quantity.

For the double distilled lily-water fill the glass cucurbit half full with flowers, and place it in *balneo mariæ* with putting water to them. In this manner you will get a fine lily-water, and a beautifier to the skin. If you distil the lilies in a hot season, you will get a quintessence. When you draw over the double water, let it be only the fourth part, and the quintessence will swim on the surface, which, by decanting off the water, you will preserve in the receiver.

Of Carnations and Pinks.

THE carnations used by distillers are the little small ones, which have only four leaves, and to make a good choice of them, you pitch upon such as are of a deep red, terminating into black, of a velvet hue. You must gather them in warm weather. These pinks blow thrice in the summer, the first blown are the best, for they are of more strength, and of a volatile smell. The third sort are cheapest, but as they are more common than the first, they are not of so much value, though they are not to be despised.

When you have gathered your pinks, pluck off the leaves, and cut away the white end of them, which has no smell, and lessens the colour of the water. This done, put them into a stone bottle, and when full, pour brandy to them; letting them, thus infused, stand for six weeks, you put some cloves to them, in order to extract the flavour from the leaves. In case you cannot get a sufficient quantity of pinks to fill a large bottle, take a less, but be sure to fill it to the top; and then, but not before, pour in your brandy, and close it up, to prevent its evaporating, and lessening the odour of the flowers. After six weeks, pour the infusion through a sieve, and press the liquid gently from the flowers: dissolve sugar in fresh water, and put it in the infusion; and having mixed both well together, pour it through a filtering bag, and your pink-water is ready, and is the more valuable, if it has the distinguished quality of being of a beautiful crimson colour.

RECEIPT.

TAKE one half of the infusion, and one half of syrup; to one quart of syrup use six ounces of sugar.

Another more expeditious Method.

AFTER you have gathered and trimmed your pinks as above, you put them not in infusion, but you pour water on them, and put them on the fire: in three hours' time the colour will be extracted, and, red as the leaves of the pinks were before this decoction, they will now be quite pale. When this is done, put in a few cloves, and then pour the liquid through a hair sieve, press it out, and make a syrup according to the strength of the tincture. If the colour is pale, then dissolve your sugar in that menstruum; whereupon take as many measures of brandy as you do of syrup, and it is done.

Of Jessamine.

THERE are two sorts of jessamine, both good for use, these are the common and the Spanish, which last is preferable,

ferable, as the blossom is finer, larger, and stronger of scent than the common-jessamine.

You gather the jessamine-blossoms, before sun-rising, when they have not lost any of their volatile smell, but have that strength which the air and the cool of the night communicates to all flowers.

You part the blossoms from the green they are enclosed in, and use them soon, lest they lose some of their odour: put them into your still, and pour water and brandy on them, as shall be directed in the receipt, and distil it with a pretty strong fire, care being taken to bring over none of the phlegm.

The spirits being all drawn over, close your receiver with a cork, then, having dissolved your sugar in fresh water, you pour your spirits, not in the syrup, but the syrup in the receiver, upon the spirits. This done, cork your receiver directly, and do not filter it till the next day, that it may have time to cool, and preserve its odour.

Cover the tunnel whilst your liquor runs through the filtering bag, and be very careful in following directions, if you will make your jessamine-water perfect.

Receipt for Six Quarts.

TAKE three quarts and a half quartern of brandy, one quartern of water, six ounces of jessamine, and for the syrup, take one pound of sugar, to three quarts and half a quartern of water.

If you will make your jessamine-water fine, and rich of sugar, then take four quarts of brandy, one quartern of water, eight ounces of jessamine, and four pounds of sugar. for the syrup, use a little above two quarts of water.

If you have your liquor stronger than ordinary, then take four quarts of brandy, one quartern of water, and ten ounces of jessamine: for the syrup, take two quarts of water, and two pounds of sugar.

Of Violets.

The single-violets in the spring are much preferable to the double ones in autumn, and fitter for use.

You must follow in these the directions given concerning the management of other flowers.

Having gathered your violets, part the blossom from the green, and put them in infusion in brandy.

The excellency of this flower consists in its beautiful colour and fine smell. Its colour, both for syrup and liquid, is carefully extracted by infusion, and the value of either the one or the other is according to the beauty of its colour.

Your violets having been for a month kept in infusion, you take and pour the same through a sieve, dissolve sugar in fresh water, and put the liquor of your infusion into the syrup, mixing both well together, after which, pour it through your filtering-bag, and your liquor will be ready, and good.

Use your flowers as soon as possible after they are gathered, lest their volatile odour should depart.

Let the vessel you infuse them in be full of the flowers, but not squeezed or pressed down: the reason for so doing has been given before.

In order to make despatch, you may proceed to extract the tincture by fire, in the same manner as has been directed concerning the pinks, and the receipt how to make violet-water is the same with that of pinks, only you omit putting cloves into it.

Of the Jonquil.

This flower blows in March and April, and is of a pale yellow; some of them are single and some double, but the single ones are the best, and have the strongest scent in which it is not inferior to any other; it is of great use to perfumers to make sweet-scented powders, pomatums, waters, and essences. The manner of using it in liquors is as follows:

Make choice of single jonquils, and especially of such as have a fine flavour or smell; take the leaves, and infuse them in brandy, as has been directed in the foregoing article concerning the violets, keeping the infusion in a pretty moderate warm place.

The infusion being made, dissolve as much sugar as the quantity of your liquor requires; and having first poured the liquid through a sieve, mix the syrup with it, and filter it through your bag, to clear it.

If you will distil it over a fire, then follow the directions given concerning jessamine; but as the jonquils do not communicate their colour by distilling, you take sugar that is a little burnt, by which you will give your liquid that colour it should have from the flower. This depends on the judgment of the distiller.

You may also from roses draw a quintessence for perfuming of liquors, powders, essences, and other things.

Of the Colours and Tinctures of Flowers or Blossoms.

THE most usual colours of liquors are crimson, cherry, rose, orange, lemon, purple and blue: these colours are prepared from turnsole and cochineal, and from the infusion of flowers.

The red colour bears the pre-eminence above all others; and it may be brought to any degree of shade, by cochineal alone, with the help of alum; which is thus managed:

To tincture six quarts of liquor of a crimson colour, take three drachms of cochineal, and half a drachm of alum; beat both together to an impalpable powder: this done, take about a quarter, or rather less, of boiling hot water; pour it on the powder in the mortar, incorporating it well with your pestle, and pouring it directly into your liquor, which is ready mixed with the syrup, and ready for the filtering-bag.

If you will have a lighter red, use less cochineal; but proceed as before.

To be of a scarlet colour, take of kermes-berries two drachms, half a drachm of alum, and as much cream of tartar; to make your colour lighter, you add more cream of tartar, but very little at a time.

The reader is to take notice, that the quantity of the above ingredients is fixed for a certain quantity of liquor, which, according to the quantity of liquor you have to tincture, must be either augmented or lessened.

How to make a Yellow Colour.

LIQUORS are naturally white, and would remain so, if they were not beautified with colours by art.

Some distillers extract a yellow colour by infusion from yellow pinks, either in water or spirits.

If you extract this colour by immersing the flowers in water, you put them into a pan, and having poured water on them, you set the pan on a slow fire.

When you extract this colour with spirits of wine, you fill a bottle with the leaves, without pressing them down, pouring the spirit on them. But as we cannot at all times have flowers, we may, instead of them, supply our wants in the following manner:

Take sugar, with a little water, in an iron ladle; put it over a fire, keeping it stirring, to prevent one part burning before another is dissolved; when all is melted, still keep on stirring till you see the matter turn yellow, and, growing deeper and deeper, take particular notice when it begins to grow blackish; then pour water upon it, to dilute it, then strain it through a linen cloth, and pour so much into your liquor as will tincture it, according to your fancy, either lighter or deeper.

To make Violet or Purple Colour.

TAKE turnsole, beat it in a mortar to a fine powder; pour on it boiling water, and stir it well together, then pour it into your liquor, before it has gone through the filtering-bag.

If your liquor has gone through the filtering-bag, then leave your turnsole whole, and boil it in a saucepan for about half an hour. The water will be tinctured, and easily filtrated, and then mix it with the liquor. Care must be taken that nothing acid, be it what it will, be mixed with it in the operation. You may, by mixing this with the tincture of cochineal, make this colour of what shade you please.

To prepare a Blue Colour.

IF you intend to extract tinctures from flowers, you pluck off the coloured leaves, and put them in a pan, or in a glass vessel, and pour water thereon; then, putting it on a soft fire, or sand-heat, the infusion will soon extract the colour, and leave the flowers faded. You must never distil flowers for extracting of colour, because all that comes over the helm is white.

When you intend to make a blue tincture, you must make use of flowers of that colour. You must pitch upon such as have the deepest, such as hyacinths, and blue corn-flowers, from which the distillers press out the tincture.

You may distil, from corn-flowers, water good for the eyes, and an excellent beautifier of the skin; especially in such cases where the sun has occasioned the face to be tanned.

Of

Of Aromatic Herbs or Plants; and, first, of Lavender.

LAVENDER is a plant that has a strong but pleasant smell, which it retains for a long while after the stalks are quite dried up. A water is distilled from it, which is useful for more things than any other herb whatever.

You gather the full blown tops in warm weather, a little before, or presently after, sun-rising. You part the flower from the stalk, and put them in to be distilled, either with water or spirits. Simple lavender-water is but seldom used, except it be for washballs. If you make a simple water, distil it with a pretty strong fire.

If you intend to draw it over with spirits, then put the blossoms into the still, and having infused them with water and brandy, distil over a slow fire.

Lavender-water is distilled with water only, with spirits only, and with rectified brandy. You will be directed by the receipts given for all aromatic herbs in general.

Receipt for Four Quarts of Lavender-water with Spirits of Wine.

PUT five quarts and one quartern of spirits of wine, and two ounces of lavender quintessence, without water, in the still; but if you will make it more perfect, put three or four ounces of quintessence to it, and so distil it over, taking care the phlegm be left behind, which would be otherwise a great detriment to your commodity.

If you will make use of the herb itself, then strip the blossom from the stalk; and to one pound of blossom add one quartern of brandy, and one quartern of water.

For Four Quarts of Spirits of Lavender, with rectified Spirits of Wine.

Draw the spirits of seven quarts of brandy over by itself; then put these spirits, together with four ounces of quintessence, in the still, to rectify.

If you make use of the plant, then put half a pound of blossoms, and as much brandy as before, to bring over the low spirits; and a quartern of water, to hinder the ingredients burning to the bottom. When you have brought it over, add half a pound more of lavender to the distilled spirits, and rectify them without water.

Of the Quintessence of Lavender, or other Aromatic Herbs.

It may happen that a distiller is in a place where he cannot have the quintessence of lavender; he then would be at a loss, if he were unacquainted with the nature of drawing it out of the lavender itself. This is a secret but few distillers know, and is as follows:

Take off the blossoms from the stalks (which must be fresh with sun-rising in warm weather;) spread the blossoms on a white linen cloth, and lay them in the [illegible] for twenty-four hours; after which, stamp or bruise them; then put them, immersed in warm water, into the still, over a well covered fire, or hot ashes, and let them infuse for the space of five or six hours, without the helm, yet so covered that nothing may exhale from it; after which time, take off the covering and quickly put on the helm, and lute it carefully. You must in the beginning draw over half the quantity of the water you put in. If you take away the receiver, you will see the quintessence on the surface of the water, which you may separate from it, as you do that of the orange. Then put the distilled water back again, and distil it over again, till there appear no more of the quintessence on the water. You may distil this water four or five times over, according as you perceive the quintessence upon it.

The best distilling utensils for this work are those for the *balneum mariæ*, or a sand-heat; meanwhile you may, after the common method, distil the ingredients on an open fire. But if you intend to make quintessence for waters, you may make use of common salt, in order to extract the more quintessence of any blossom.

Take four pounds of blossoms of any aromatic plant, and infuse in six quarts of water. If you use salt to bring your infusion to a ferment, add half a pound of common salt to it.

Of Sweet-marjoram.

THIS plant has a strong aromatic smell, and a sharp flavour, a little inclining to bitter. This herb is said to be an excellent remedy for disorders of the brain and stomach.

There are distilled of sweet-marjoram, simple waters, spirituous liquors, and quintessences. The simple water is distilled in the same manner as that of lavender, and likewise the quintessence. If you will have a spirituous liquor, you must proceed as follows:

Take fresh-gathered sweet-marjoram, that has been cut soon after sun-rising, lest the heat of the sun should extract the strength; separate the leaves and knobs from the stalks (if it is in blossom it will be the better;) put them together into the still, and pour brandy to it, with a little water, if you distil it by fire, but if in *balneo mariæ*, or sand-heat, then put no water to it, because your ingredients are in no danger of being burnt to the bottom of the still. Be careful to bring no phlegm into the receiver. If you distil it on fire, observe a due degree, that it be not too fierce.

Receipt

Receipt for ordinary Sweet-marjoram Water.

Put into your still six quarts of brandy, two quarts of sweet-marjoram, and, if you distil it open fire, one quart of water; but if in *balneo mariæ*, you omit putting water to it.

To make rectified Sweet-marjoram Water.

Put six quarts of brandy, and two pounds of sweet-marjoram, into the still; draw off the spirits, and put them again into your still, adding half a pound more of sweet-marjoram, to rectify. The best manner of rectifying it is to do it in *balneo mariæ.*

Of Rosemary.

This is an aromatic shrub or plant, of an agreeable odour; simple water is distilled from it, but principally it is made use of for distilling of Hungary-water.

Hungary-water is the first sweet-scented water which made its appearance here from Germany. This water at first was only an infusion, till at last it was, with great success, distilled at Montpellier, where, to this day, it is carried on to the greatest perfection.

The chief ingredient of this water is the rosemary: if you can have a sufficient quantity of blossoms, you take only them for distilling, which will make it better and more complete; but for want of the blossom, you may make use of the twigs and sprigs of the plant, either with what blossoms you can gather, or without them. The plant has the same smell as the blossom, but neither the quantity nor goodness; nor is the smell so delicate.

If you intend to distil the water from blossoms, you must gather them by sun-rising; use them fresh, and put them directly into the still; in the same manner, you proceed with the slips or sprigs; you then put brandy to them, and extract the ingredients in *balneo Mariæ*, with a fierce fire. Care must be taken to prevent the phlegm coming over; and your Hungary-water will be complete.

A Receipt for Four Quarts of Hungary Water.

PUT into your still half a pound of rosemary blossoms, with one pound of the slips; but if you have no blossoms, then put two pounds of slips, and distil it in *balneo mariæ* with six quarts of brandy, or spirits of wine.

You may draw the quintessence in the same manner as you do that from lavender.

Of Thyme and Sage.

THYME is a well-known plant; the best grows in warm climates. The blossoms are of a purple colour, and small. This plant is good for cold constitutions; it puts the blood in motion, and strengthens the heart. The distillers use it like other aromatic plants, for simple waters, liquors, and quintessence.

Sage is likewise a common plant; it grows plentifully here, but better in hotter climates. The blossoms are blue, or purple.

There is a small sort of sage, called sage of *Provence*, which is held in high esteem on account of its great virtues. It grows plentifully along the Rhine.

From sage is likewise distilled a simple water, liquors, and quintessence.

A Receipt for the Distilling of Thyme.

To distil a spirituous liquor from thyme, take fresh gathered thyme when in blossom, and the weather warm;

strip the leaves and blossoms from the stalks, and put them, with brandy, into you still; luting it well, you put it on a moderate fire, and distil the ingredients, taking particular care that the phlegm is not drawn over, which would spoil all. Then dissolve your sugar, and pour the distilled spirits into the syrup; clear it through a filtering-bag, and it is ready.

If you intend to have sweet-smelling water of thyme, then proceed in the following manner:

Put your stript blossoms and leaves into your still, filling it to the fourth part, pour on it two quarts of water, and, for the remaining part, brandy, till your vessel comes to be half full. In the distilling, take care concerning the phlegm.

Receipt for Five Quarts of Sprituous Liquor of Thyme.

TAKE three quarts and one quartern of brandy, or spirits of wine, to three handfuls of thyme, leaves and flowers together; and for the syrup, take one pound and a half of sugar, and two quarts of water.

Receipt for Three Quarts of Sweet-scented Water of Thyme.

TAKE, as has been observed before, the leaves and blossoms of thyme; fill your still to the fourth part with them; pour two quarts of water upon them; and add so much brandy as will raise it to half the height in your still; then distil it over a moderate fire, so as to let no phlegm get into your receiver.

Receipt for simple and double Water of Thyme.

TAKE thyme, when green; bruise it, and distil both leaves and flowers together, in *balneo mariæ*. For the double, pour no water to it; but for the single, put to it some water, and distil it over an open fire.

Receipt for distilling of simple Waters and Spirits of Sage.

CUT your sage early in the morning, in warm and dry weather, and put it directly into the still, with a little water; distil it with a brisk fire, care being taken to bring over no phlegm.

If you intend to distil it with spirits, you pour water and brandy upon the ingredients, and proceed as before, over an open fire.

If double-distilled, you do it in *balneo mariæ*, without putting any water to it. For the quintessence, you proceed as has been taught before.

Of salutary Herbs for Wounds, or the preparing of Wound-water.

BY salutary herbs for wounds is understood such as are unctuous, healing, and refreshing; of the leaves and blossoms of which an infusion is made, of great virtue in healing of wounds: it is prepared likewise by distillation.

They are distilled with pure water, or with spirits, wherein both leaves and flowers are made use of.

The water which is made from leaves only, is called wound-water; and that which is made of the blossoms, is called gun-shot-water.

The gun-shot-water has been improved, by an addition of several aromatic and healing herbs, by which it has received a greater degree of virtue: we shall give the receipt hereafter. The art and method of making the wound-water is as follows:

Get from the simplers, or physic herb-shops, wound-herbs that are brought from Switzerland: look for the freshest, for you may, by the smell, distinguish them from such as are old. The fresh will have a greenish hue, and the odour of them is much stronger.

Receipt for making Four Quarts of Wound-water with Spirits.

Put half a pound of the leaves of any wound herb, or six ounces of the blossoms, together with six quarts of spirits, and no water, into the still; distil them over a slow fire, and bring over four quarts of spirits.

Receipt for Four Quarts of Simple Wound-water.

Take the same quantity of leaves or blossoms, and put them, with six quarts of water, into the still: bring over four quarts of water. For this you must make a stronger fire, because water is not so easily drawn over as spirits.

The Names of several salutary Herbs, for Wound-water.

1. Comfrey. A common plant; grows in meadows, by river sides, and ditches in fruitful grounds. It flowers in May and June, and seeds in August.

2. Common mug-wort. It grows by the highways, and ditch-sides; and, plentifully, in light ground in corn-fields.

3. Bugle, grows in wet and moist fields, and flowers from May to July.

4. Sage. This herb being so well known, needs no farther description.

5. Water-betony, grows plentifully by brooks and rivers' sides, in most ditches, and watery places. It flowers in July and August, and the seed is ripe in September.

And wood-betony delights to grow in woods, and shady hedge-rows; in which places, if it be dry ground, you shall not miss of it. It flowers in June and July.

6. Sanicle, grows in woody shady places, and under hedges. It flowers in July, and the seed is ripe soon after.

7. Agrimony, grows frequently in hedge-rows of corn-fields, and by highway-sides, and in woods and copses. It is in its prime in July. The seed is ripe the latter end of the summer. You may gather the herb any time of the year.

8. Plantin, is well known every where in England. It flourishes in June, and the seed is ripe soon after.

9. Vervain. It is by some called Holy-herb, Juno's-tears, and pigeon's-grass. It grows plentifully by hedges, and way-sides. It flowers in July and August.

10. Fennel, is an herb well known in gardens. It flowers in June and July.

11. Wormwood, is very well known. The Roman wormwood is planted in gardens. It flowers in August.

12. Eluellyn, in Welsh, or the Veronica, in Latin, in English, Speedwell, grows upon dry banks and wood-sides, likewise in sandy ground. It flowers in June and July, and the seed is ripe in August.

13. St. John's-wort, grows plentifully by fields, by wood-sides, and copses, also in hedge-rows. It flowers about Midsummer, and the seed is ripe in August.

14. Birthwort, *Aristolochia* in Latin. This plant is only to be had fresh in physic gardens: its native soil is in Spain, Italy, and about Montpellier, where it flowers in May, June, and July.

15. Mint is well known to every body.

16. Tobacco, delights in a fruitful soil, and is here and there to be met with, particularly in physic-gardens.

17. Hyssop, grows most frequent in gardens, and against walls: it flowers in June and July, and the seed is ripe in August.

You gather these herbs, if possible, in warm weather, in the end of June, or the beginning of July, when they are in their prime: you cut them small, and bruise them; which being done, you put a handful of each of them into a large earthen pan; pour thereon ten quarts of white wine, and six quarts of brandy, or spirits of wine, and let them lay in digestion for three or four days, either in hot dung, or on a baker's oven; after which time, put the infusion into a still, with the worm in the refrigerant; distil it on a moderate fire, and draw over about the fourth part of the spirits, which will be about six quarts: care must be taken that the phlegm be not drawn over.

Observe that the pan wherein you make the infusion be close covered and luted, to prevent the evaporation of the spirits.

Receipt for Six Quarts of simple Gun-shot-water.

TAKE of the before-specified herbs, of each a handful; cut and bruise them as above; put them into the still, with twelve quarts of water; cover them, and keep them over a slow fire for about six hours, to digest. After which time, encrease your fire; put on the helm, and lute it as usual, and draw over about twelve quarts. This simple water will be of great virtue, in cases of bruises, scratches, wounds, &c. The most dangerous and deep wounds have in a very little time been healed by it. When salve would have kept a wound for ever without healing, this wound-water would have cured it in a few days, nay frequently in twenty-four hours; and none ought to be without it, especially such as use sharp-edged tools.

Of SPICES.

SPICES are ingredients that distillers are but little acquainted with, although of singular use in their business:

the ingenious reader will therefore well observe the instructions given in the following articles.

Of Cinnamon.

CINNAMON is the second bark of the branches of a certain tree called the zimmet-tree, which grows in both the East and West Indies, particularly in the Islands of Ceylon and Java, and the Malabar coast.

The liquor distilled from this spice is called cinnamon-water, and is one of the finest cordials that can be desired.

To make it, you will follow the directions given in the receipt below: having got the proportionate quantity of cinnamon, beat it so in a mortar as to cause the spirits easily to rise: this done, put it into your distilling vessel, pouring thereon a very little water and brandy, and distilling it over a moderate fire.

The spirit that is brought over first, has very little of the flavour or taste of the cinnamon, but it encreases, and goes over with the spirits at the end; for which reason you always let a little phlegm go along with it, in case you would have the taste of the spice.

You likewise observe not to put so much water to spices, as to other distillations.

When you have distilled over your spirits, dissolve sugar in fresh water, and pour the spirits into the syrup; after which, filter it through your filtering-bag.

Receipt for Six Quarts of Cinnamon-water.

BEAT one ounce of cinnamon to an impalpable powder, and put it, with half a pint of water, into your distilling-vessel; put also three quarts and a quartern of brandy to it: for the syrup, take one pound and a quarter of sugar, and three quarts of water.

How to distil Cinnamomum.

SOME distillers add mace to the cinnamon, which makes the cordial much richer, and is on that account called cinnamomum.

You beat both the spices together, or each apart, to a fine powder: after which, you put them, with brandy and water, into the still, and distil them over a moderate fire: you draw, as has been observed before, a little phlegm over along with the spirits, and proceed as above.

Receipt for about Six Quarts of Cinnamomum.

TAKE an ounce and a half of cinnamon, and two drachms of mace; beat both to a fine powder; put this, with four quarts of brandy, and a quartern of water, into the still, and distil it over a moderate fire: and for the syrup, take four pounds of sugar, and two quarts and a quartern of water.

Of Mace.

If you make choice of mace, take such as is heavy, and of an amber colour, and shining, as though it were drawn over with a varnish.

Receipt for about Five Quarts and a Pint of single Water of Mace.

TAKE half an ounce of mace; beat it to a fine powder, and distil it with three quarts, and half a quartern, of brandy, and a little water. For the syrup, you take two quarts and three half quarterns of water, and one pound and a quarter of sugar.

Receipt for about Six Quarts of double distilled Water of Mace.

Take six drachms of mace; beat it to powder, and put it, with four quarts of brandy, into your distilling vessel. For the syrup take four pounds of sugar, and two quarts and a quartern of water.

If you take an ounce of powdered mace, and distil it with four quarts of brandy, it will be better still, and produce five quarts and a pint of cordial. For the syrup, take two quarts of water, and two pounds and a quarter of sugar.

Of Nutmegs.

For the distilling of nutmegs, we must make choice of such as are heavy, and of a strong and fine smell, and good flavour.

You put them into a mortar, and beat them to a powder: but as, by beating, they generally turn them into a sort of paste, your best way will be to grate them; after which, you distil them as you do other spices.

Receipt for the common, the fine, the dry, and the double distilled Cordials of Nutmegs.

Take the same quantity of brandy as you do mace: for the common, take one small nutmeg; for the fine, one of the larger sort: for the double and dry, take one nutmeg and a half: sugar and water as in the foregoing.

Of Cloves.

Distillers use this spice for several liquors: there is likewise a quintessence, or oil, drawn from them. Cloves are comforting to the head, heart, and other vital parts; they strengthen nature, break wind, are good against infection, and stay vomiting. The chemical oil is good in a quartan ague, and weakness of the stomach: two drops given in beer or wine, or other drink, eases the tooth-ache.

The colour of cloves is brown; the deepest are the best, and ought to be made choice of for distilling.

Receipt for about Six Quarts of Clove-cordial.

TAKE one drachm, or eighteen cloves, and having beat them in a mortar to powder, put them, with three quarts and one quartern of brandy, into your still, and distil it over a moderate fire: bring over along with it a little of the phlegm, as you do in distilling of all other spices. For your syrup, take one pound and a quarter of sugar, and dissolve it in three quarts of water.

Receipt for a common Cordial of Cloves.

TAKE half a drachm of cloves, two drachms of mace, four quarts of brandy, and one quartern of water: for the syrup, take three quarters of a pound of sugar, and three quarts of water. By adding more or less spice, you may make your cordial of what goodness and strength you please.

Of the Quintessence of Spices.

To draw the quintessence from spice is the most difficult task in distilling; for if it is extracted in the same manner as from aromatic plants, it will produce but very little; but in order to make it answer more to the advantage of the public, in procuring a medium between the excellency of the oil, and the distilled spirits of spices, we must proceed in the following manner:

Instead of extracting an oil, you make, for example, a tincture of cinnamon, which comes up very near to the quintessence, and is made with rectified spirits, like the tincture of amber, nutmegs, and cinnamon: you beat the cinnamon in a mortar to a fine powder, covering the same with a leather, to prevent the dispersion of the effluvia; after which, you search it through a fine hair sieve that has a covering: what remains, you beat again in the mortar, and sift it as before. Then put the powder into a small cucurbit, and pour on it rectified spirit; stop it close with a sound cork, and secure it all round with melted wax. The spirits must be about two inches over the cinnamon. In this state of infusion you leave it for the space of fourteen days, shaking it once every day; after which time, you let it for some days stand to settle, that you may gently pour off the spirits as clear as possible. You must decant it slowly, so as to cause no motion to the cinnamon. The colour of this quintessence, or tincture, will be reddish. This is the method of drawing a quintessence without much expence.

You draw the quintessence from cloves after the same manner.

To make the Quintessence of Nutmegs.

You take one pound, and beat them in a mortar, and they will become a dough, which you spread on a new linen cloth, and put into a sieve; then put it over an ash fire, or make use of a kettle, or sauce-pan, of the size of your sieve, filling it about half full of water, so that upon occasion you may pour more to it. Your kettle must be pretty deep, so that the steam of the water may play freely, and that the water, when boiling, may not touch the sieve, but the steam may penetrate into the nutmegs. You must cover your sieve close with an earthen dish or plate; then set it over a fire till you can't suffer your hand to lie upon the dish. As soon as the nutmeg is become hot and moist, it will be qualified for drawing out the quintessence. You then take two smooth iron or copper plates, which you heat to the degree usual for ironing of linen. The plates being ready, take the linen cloth with the nutmegs, hot as they are, and wrap the cloth together, and tie it with a strong cord: put it between the plates, under a press, and the quintessence will soon discharge itself from the nutmegs. The water which may, from the steam, come along with the quintessence, you separate; and you will have an excellent oil, or quintessence, of that spice.

By the same method you draw the quintessence from mace and cloves; but to extract it thus from cinnamon is impracticable.

If you will draw the quintessence from spices, as you do from aromatic herbs or plants, take of them four pounds, with six quarts of water; but if you extract them over an ash fire, or sand-heat, then take only two pounds.

There is another method to extract oil or quintessence, per descensum, from the cloves, which is thus performed.

Take, according to the quantity you intend to distil, several large wine-glasses; cover them with linen, tying it close about under the rim, so as not to be strained a-top, but to be a little concave, in order to keep the cloves, which must be pulverized, from scattering. Having thus put them on the glasses, set on them a brass or copper saucer made for that purpose, so that, between the rim of the glass and the saucer there may remain no vent; put hot ashes into the saucer, which by degrees will warm the cloves, when some of the spirits that thicken will dissolve, and precipitate to the bottom of the glass, at last distilling a white and clear oil. Continue to keep your cloves to a degree of heat equal to that you begun with, till no more precipitates from the cloves: the oil you may separate from the first precipitated liquor, and keep it in a well-closed vial.

Of

Of Seeds.

Having, under the preceding articles, shewn the use of blossoms, aromatic plants, &c. in distilling, we now come to the aromatic seeds.

Anise-seed.

The distillers make a water called anise-seed water. They ought to be well experienced in the choice of this seed, for there are two sorts, the inland and the Spanish: the Spanish anise-seed is as large as the juniper-berry, and of an excellent flavour, but it yields little in distilling; the inland is called the green anise-seed, which retains its colour for a long time, though dry. If you buy any, make choice of such as are heavy : such as are of a brown colour you may conclude are stale, and not fit for use. You need not have them dry, when you can get them fresh. To make it produce more than ordinary, you stamp them with a third part of fennel-seed, which you likewise stamp. The anise by itself is too faint and simple, but when fennel is mixt, it is of a more dry and palatable flavour, and is prevented from being mouldy. This is an article which ought to be carefully preserved by distillers, as the consumption of the liquor is very considerable.

Receipt for Six Quarts of Anise-seed water.

Put two quarts of brandy, one quartern of water, one ounce of fennel-seed, and two ounces of anise-seed, into your still. For your syrup, take one pound and a quarter of sugar, and dissolve it in three quarts of water ; then put one quart and half a quartern of brandy, together with the spirits, into the syrup, and strain it through a filtering-bag.

Spirits

Spirits of Anise-seed.

THE spirit of anise-seed is, for retail dealers, of particular benefit, and therefore the distiller is sometimes obliged to make a spirit that may serve such as either cannot, or do not, choose, to distil anise-seed water.

Some retailers will, out of one quart of spirit of anise-seed, make ten quarts of anise-seed water; others, twelve; others, fifteen, or twenty; according as they mix it with more or less brandy.

RECEIPT.

WHEN one quart of the spirit of anise-seed is to make ten quarts of liquor, take five ounces of anise-seed, a pint of brandy, and one quart of water; put them into the still, care being taken that none of the phlegm be brought over, else your liquor will certainly grow milky.

If one quart of spirits is to make fifteen quarts of liquor, then take seven ounces and a half, of anise-seed, and distil with the same quantity of brandy as above; adding only one quartern more of water to it.

If you would make twenty quarts of liquor, then take ten ounces of anise-seed, and distil with the same quantity of brandy as before, only adding one quartern of water.

Of Fennel-seed.

FENNEL-seed very much resembles that of anise-seed, so they are frequently mixt one with the other. There is one sort of a bitter, and another of a sweet, flavour, which is the only means they can be distinguished by. The distillers use fennel-seed very much, as it has all the virtues and qualifications of anise-seed, and is, among all the liquors distilled from seed, the best; to distil it well, one must be no stranger to seed. In order to choose it, the difference between that and anise-seed is, that the fennel-seed is a little bended, and more hollow than the anise-seed. The white is the best; the yellow is of no use in distilling, except it be of a pale straw-colour.

Receipt for Six Quarts of Fennel-Water.

TAKE three quarts and one quartern of brandy, two ounces of stamped fennel-seed; put them together with one quartern of water, into the still, and distil it over a moderate fire, taking care the phlegm is not brought over. For the syrup, dissolve one pound of sugar in three quarts of water; when distilled, pour the spirit in the syrup, and, having mixt both together, filter it through the bag.

Receipt for Six Quarts of double-distilled Fennel-water.

To six quarts of double-distilled fennel-water, take the same quantity of brandy as in the foregoing receipt, but a third part more of fennel-seed, and a third part less of water; for the syrup, take three pounds of sugar. If you add a small quantity of mace to your seed before you distil it, it will have the finer flavour.

Of Coriander-seed.

CORIANDER-seed is round, and has, when fresh, a disagreeable taste; but they grow sweet in time. For distilling, the dry seed is the best; they must be of a pale yellow; such as are of a deep brown-red are too stale; the best way to try is, by tasting them; if they are sweet, and of a good smell, they are fit for distilling. They have no oily substance as other seeds, and being hollow, must be stamped before they are distilled.

Receipt for Six Quarts of Coriander-water.

TAKE three quarts and a quartern of brandy, two ounces of coriander-seeds, and distil over a moderate fire. For the syrup, take one pound of sugar, and three quarts and half a quartern of water.

When you make the common coriander-water, then distil only two thirds of brandy, keeping the rest back, to mix it, with the distilled spirits, in the syrup.

If it is to be double-distilled, follow the rules given in the receipt of the double-distilled fennel-water.

Of Angelica.

THE distillers use the whole plant, but particularly the seed, the figure of which is in the shape of a half moon, flat, and of a whitish colour; it is oily, and affords a sufficient quantity of quintessence. Some private families distil a ratifia from the whole plant, because the stalk, the root, and the leaves are of one and the same taste.

This seed is stamped before it is put into the still; it yields more, and is of a more agreeable taste and smell than other seeds.

When you have made choice of your seed, and have stampt it, you put it, with a proper quantity of water and brandy, into your still. If your liquor is to be of the better sort, you take as much as possible you can of new seed, which is of a white colour; the stale seed grows yellow and reddish; and such as have been damaged upon the stem have commonly a blackish hue. If you intend to make use of the stem, or the root, of this plant, you must examine and see whether the seed be ripe; if you find that it is in its perfection, the rest of the plant is fit for use.

Receipt

Receipt for about Six Quarts of Angelica-water.

TAKE one ounce of angelica-seed; pound it well, and distil it over with three quarts and one quartern of brandy. For the syrup, dissolve one pound of sugar in three quarts of water.

If you will have it double-distilled, observe what has been directed under the article Fennel, and proceed to do it in the same manner.

Of Juniper-berries.

IN order to make geneva, or juniper-water, you first bruise the berries, and put them in a vessel wherein they may ferment, which they will in a few days, and receive thereby a spirituous and winy quality. When you perceive that the berries have received sufficient strength, strain them through a filtering bag, and draw juniper-brandy, commonly called geneva from it.

If you will make a cordial liquor from this ferment, you then must bring the berries under the press, to extract the juice from them; this juice you put into the still, and distil it without apprehension of danger; but if you put the husks in, you run the danger of their rising up to the helm, to stop the entry of the pipe, and occasion dangerous accidents.

How to make Six Quarts of Cordial from Juniper-berries.

To do this, you pound about half a pound of juniper-berries, and put them, with three quarts and a half of brandy, into the still. You must observe, that in distilling of juniper-berries, you put double the quantity of water into your distilling-vessel that you do to any other seed, in order that the berries may have sufficient moisture to fill them, and to cause the spirits to have a free and easy separation.

As the juniper-berries are apt to rise, you must be very careful about your still, and keep the fire to a proper degree of heat, to prevent mischief. When your spirits are drawn over, dissolve one pound and a quarter of sugar, with three quarts and a half of water.

A Receipt for Six Quarts of double-distilled Cordial of Juniper-berries.

TAKE four quarts of brandy, and add a third part more of the berries. For the syrup, take three pounds of sugar, and two quarts and half a quartern of water. If you will make it still more rich and dry, you must regulate yourself by the *receipt for Fennel,* as far as relates to the syrup and brandy.

How to make a good choice of Juniper-berries, fit for distilling Liquors.

YOU must always take care that they be new and fresh; they must be round, full, and of a black colour; for if they be dry and shrivelled, they are not fit to be used. As this berry is of a warm nature, you may by chewing it, soon discover if it be good; if you find it has a tart or sourish flavour, it is a sign it has been in fermentation, and worth nothing. Some discover their badness by a white mould that is upon them. If you are about buying juniper-berries, and find some dry among the fresh ones, they are of little worth. Juniper-shrubs that grow upon hills afford the best berries.

Of Celery-seed, and how to distil Celery-water.

TAKE celery-seed which is fresh, and of a good flavour, such as is of a greyish colour, heavy, and tastes of the plant (if it has not the taste of that, it is not fit for distilling). The seed being of a strong taste, communicates itself easily; wherefore little of it will do. Having pitched upon your seed, beat it in a mortar; put it, with brandy and water, into the still, and distil it on a moderate fire. If you intend to have your liquor delicate and pleasant, take heed that none of the phlegm is brought over. After distillation, mix your liquor with the syrup, as usual.

This liquor drinks not so well new, as when three or four months old.

Receipt for about Six Quarts of common Celery-water.

BEAT two drachms of celery-seed, and put it into three quarts of brandy. For the syrup, take one pound of sugar, and three quarts of water.

Receipt for Six Quarts of a fine and dry Cordial of Celery-seed.

TAKE, to three drachms of seed, four quarts of brandy. For the syrup, take two pounds and a half of sugar, to two quarts of water.

To distil Parsley-seed-water, or Persico.

HAVING pitched upon your parsley-seed for distilling the Persico, which must be fresh, and have the flavour of the plant (for if of a strange taste, it is not fit for use) then beat it, and distil it with brandy after the following manner:

Receipt for Six Quarts of Persico.

TAKE three quarts and a quartern of brandy, and half an ounce of parsley-seed; put both into the still, and distil it over a moderate fire. For the syrup, take, to three quarts and a half of water, one pound of sugar.

How to distil a Cordial from Coffee.

FOR this you make choice of the coffee that comes from the Levant, or from Moco.

Receipt for Six Quarts of Coffee-cordial.

To one ounce of roasted and ground coffee-berries, take three quarts and half a quartern of brandy, and one quartern of water; put all into the still, and distil it over a moderate fire. For the syrup, take one pound and a quarter of sugar, and three quarts and half a quartern of water. When mixt, filter it through your bag.

Receipt for Six Quarts of a fine dry Cordial of Coffee.

TAKE one ounce and a half of roasted and ground coffee-berries, four quarts of brandy, and one quartern of water. For the syrup, take four pounds of sugar, and two quarts of water; distil your liquor over a slow fire, and be very careful lest too much heat should make the coffee rise into the helm, and choak the passage through the pipe, causing other ill consequences.

How to distil Chocolate-cordial.

TAKE two ounces of cocoa, two drachms of vanilla, three quarts and half a quartern of brandy. You roast both the cocoa, and the vanilla, as though you intended to make chocolate; after which, you grind the cocoa, but not the vanilla; you then put both into the still, and distil it over a usual fire; but take heed no phlegm is carried over. When the spirits are distilled, pour them to the syrup, mixing and straining together, through a filtering-bag.

For double-distilled Chocolate-cordial.

TAKE one ounce and a half of cocoa, three drachms of vanilla, four quarts of brandy. For the syrup, take one pound of sugar, and two quarts and one quartern of water.

Of Compound Liquors.

HAVING given sufficient instructions for distilling of blossoms, fruit, aromatic herbs, spices, seeds, &c. we now shall say something concerning Compound Liquors.

Of L'Eau d'Or, or Golden-water.

THIS cordial liquor has been known by the above name for many years, and one might conclude that the receipt for it has been unalterable; nevertheless, there are many, differing one from the other. Some distil it from seed, others from spices, others again from fruit, and others from blossoms. Our author says,

"When I am distilling of gold-water, I take Seville oranges, choice cinnamon, and a little coriander-seeds; then I pare the outward peeling, which contains the quintessence, without paring the white along with it, or leaving any yellow from the outward peeling to it. The cinnamon and coriander-seed I beat in a mortar, and then put them, together with the orange-peelings, water, and brandy, into the still. I make a moderate fire under it, and distil (on account of the cinnamon, the spirits whereof come last) a little phlegm over with it: after which, I dissolve sugar in fresh water, and then pour in the distilled spirits, as soon as the distillation is over. The syrup must be made whilst the spirits are distilling; after which, mix it well with the spirits, and pour to it a little yellow colour, till the colour is to your liking; after which, you pour it through a filtering-bag, and when your liquor is bright and clear, it is ready. If some quarts of this liquor is poured through a filtering-bag, through which usquebaugh has been filtered, you mix the filtered with the same quantity that has not been filtered, and you will have a complete golden tincture. You then take as many leaves of gold as you have quarts of liquor, and put them with some liquor into a small long-bodied vial, and shake it, till all the gold leaves are as small as a wing of a small fly; this done, you pour a little of it into every bottle or flask that is filled with the liquor.

Receipt for Six Quarts of Gold-water.

TAKE three ripe Seville oranges, one drachm of coriander-seeds, two drachms of cinnamon, three quarts and one quartern of brandy, and one quartern of water, to prevent the ingredients from burning to. Put all together into the still, and draw over with it a little phlegm. For the syrup, take one pound and a quarter of sugar, and three quarts and half a quartern of water.

Of the Silver-water, or Eau d'Argent.

MOST distillers use, for gold and silver-water, one and the same receipt; but in order to give the silver-water another flavour, take, instead of the coriander and cinnamon, cloves and angelica-seeds, which beat together, and distil in the same manner as the gold-water. When the spirits are drawn over, dissolve the finest sugar in very clear water, and mix your spirits with the syrup, pouring it through a filtering-bag. The liquor being bright and clear, you put into it silver-leaf, in the same manner as before you did the gold-leaf, shaking it first in a long vial.

Receipt for Six Quarts of Silver-water.

Take the peeling of three Seville oranges, one drachm of angelica-seed, and eight cloves (which two last you beat together in a mortar); then put all together, with three quarts and half a quartern of brandy, and one quartern of water, into the still. For the syrup take three quarts and half a quartern of clear water, and one pound of the finest sugar you can get. You must, on account of the cloves, draw over a little phlegm, if you will have the flavour of that spice.

How to distil Irish Usquebaugh.

The best brandy for distilling the Irish usquebaugh is that which is distilled from malt, which is to have the strength of wine-brandy.

Receipt for Irish Usquebaugh.

Put four quarts of good rich malt-spirits, with a quartern of water, into the still; then take half an ounce of saffron, ten drops of the quintessences of the cedar, bergamot, Portugal orange and lemon, and half an ounce of cinnamon, half a drachm of vanilla, one drachm of mace, eight cloves, one drachm of angelica-seed, half a drachm of coriander-seed, and as much sugar-root-seed. All these seeds and spices you beat in a mortar, and distil with the malt-spirit and water, as above, over a moderate fire. For your syrup, take three pounds of sugar, and one quart of water. For the tincture, take half an ounce of saffron, and a quartern of boiling-hot water.

Receipt for the superfine White Irish Usquebaugh.

FOR this, you proceed according to the foregoing receipt, both as to the liquor and syrup; but as it is not to be tinctured, you put all the saffron, namely, an ounce, into the still.

To make the Dantzic Aqua-vitæ.

THIS you distil of the best fresh white wine. To one quart of aqua-vitæ you use four quarts of wine; so that, for eight quarts, you must have eight gallons. You may give it the flavour of any thing you have a mind, by distilling it together with the wine, adding as much again to this to what you do to other liquors of the same quantity.

Of Simple Waters.

THE simple waters, such as are extracted from orange-blossoms, or lavender, and other aromatic plants, are very valuable; since by them we may give their respective flavour to other liquors and things, and by that means save abundance of labour, pains, and expence.

The simple waters of orange, lemon-peel, and others, are not only used by perfumers, but they are also of great use in the kitchen, for making of ragouts. There are excellent waters distilled from thyme, sage, chervil, parsley, sorrel, and other kitchen-herbs, which retain their natural flavour, and supply the want of them in the winter season.

We know, by experience, that distilled waters of spices have more odour and volatile essence than the spices themselves; for the distillation frees them from the gross parts, and a superfine spirit is thereby extracted, whereof two or three drops, according to the quantity of meat, or sauce to be seasoned, will be of more effect than the seasoning it with a larger quantity of the spice itself. The *spirit of spice* is principally useful in sauces and meats that are of a transparent and clear nature, which, by the solid spices, are rendered thick and obscure.

You distil orange-blossoms and lily whole; but the rest of the blossoms you bruise, before you distil them.

With respect to the waters that are brought over with the quintessence, they will be of great use and benefit for liquors.

If you distil simple waters from Switzer wound-herbs, you must leave them whole; but such as are gathered here must be cut small, in order to raise the phlegm, or water that contains the virtue of those herbs, with more ease.

Physical-herbs, as chervil, cresses, borage, plantane, and others, you bruise before distillation, for the same purpose.

If you distil simple nut-water, you take the nuts fourteen days before they are ripe enough to eat, and after having stampt them, you distil them over a large fire.

Thus you may, from most productions of the earth, as blossoms, fruits, plants, &c. extract, or distil, simple waters to perfection.

Of Ratifia.

Of Red Ratifia, and the Ingredients for making it.

RATIFIA is a liquor much in vogue. To make red ratifia, most of the red fruits are proper—as morel and black cherries, strawberries, raspberries, currants, mulberries, and the like.

There are three sorts of ratifia, the fine, the dry, and the common; each of them is made of the above fruits, which, in making your ratifia, you must choose in their prime of ripeness, and of a pleasant flavour. The black cherries must be full ripe, as the juice is chiefly for colouring your ratifia; the sweeter this cherry, the more it will lessen the expence of sugar to sweeten your ratifia.

The currants must be full ripe, and transparent; they must be fresh gathered, and directly used.

The strawberries and raspberries must likewise be used when full ripe, and be well coloured.

Receipt for the Fine Ratifia of Red Fruits.

TAKE the fruits of cherries, strawberries, currants, mulberries, &c. bruise and infuse them over night; then press out the liquor or juice, and add, according to the quantity thereof, some sugar; that being dissolved, pour it through the filtering bag; when you find it clear, then put the brandy to it. The raspberries give the ratifia a fine flavour, which is heightened by the spices, which must be prepared in the following manner:

Take, to one quart of brandy, four times as much cinnamon as mace, and four times as much mace as cloves; distil these with brandy, and, as soon as distilled, mix with your ratifia, and make it as strong as you think proper; after which, put it up in a cellar. The rule for the quantity of brandy is, two quarts of juice to one quart of brandy.

Receipt for a fine and dry Ratifia.

TAKE morel cherries, and currants, of each thirty pounds; about ten pounds of mulberries, and seven pounds of strawberries, well picked and bruised; let this mixture stand one night, but no longer, lest it should begin to ferment; you then press out the juice, and measure it, adding, to each quart, three ounces of sugar; when this is

dissolved,

dissolved, strain it through a filtering bag: if your juice is clear, and you have twenty quarts, then put to it twelve quarts and one quartern of brandy, namely, one-fourth part more than to the sweet ratifia.

The common ratifia is made of currants and black cherries, which you bruise, and let stand for three days before you press them, so as they may ferment, and by that means grow something strong: of brandy you use but a small quantity to this mixture; merely so much as is requisite to preserve the juice.

After it has fermented, strain it through your filtering bag; put in your sugar, fill your cask, and put it up in your cellar.

The common ratifia will, with age, lose the pleasant flavour and vivacity of the colour, which are the principal qualities. To rectify this, when you perceive it begins to fret, put, according to the quantity, some brandy to it; which will prevent the ferment, and preserve the ratifia.

If you have a stock of ratifia at the time the fruit is ripe, take of the sort of fruit you made use of before, adding half the quantity of black cherries, and half the quantity of brandy; this will restore the colour and the strength. When, for example, you have forty quarts of old ratifia remaining, you must add ten quarts of the preparation as directed, and your old ratifia will, in eight days' time, have the same quality as the new.

Of the White Ratifia.

As red fruits are the principals of red ratifia, so are the white fruits the principal ingredients of the white ratifia, or, as it is otherwise called, *ratifiet*, because these liquors are made without distillation, by infusion and filtration; when, on the contrary, those that are extracted or distilled, go under the appellation of water or spirit.

The several sorts of white ratifia are the muscatella ratifia; the ratifia of quinces, the nut ratifia, and the ratifia of the several sorts of white plumbs, particularly the white-gage.

The muscatella ratifia is one of the best, and most in vogue: to make it, we must choose thoroughly ripe muscatella-grapes that have not been long cut. If any of the berries are corrupt, you must clear them away, and only pick such as are thoroughly ripe and sound, putting them into a vessel in which they are crushed and bruised; then putting them into a white cloth, press all the juice out of them. this being done, filter it through your filtering bag. As soon as it is gone through, put in your sugar; that being dissolved, pour your brandy, or spirits of wine to it. Concerning the spices, you will follow the direction in the following

RECEIPT.

If you have twenty quarts of muscatella-juice, then take five pounds ten ounces of sugar, ten quarts of brandy, and as much spirits of mace and nutmeg as you think proper, to make it rich of spice. If you will have it sweeter, add more sugar than the above quantity.

Of Nut Ratifia.

Having gathered your nuts before they are ripe, you boil them in water; and, when boiling hot, you take them out, and put them in fresh water, letting them remain therein for twenty-four hours; after this, you pour off that, and put fresh water upon them; thus you shift the water, every twenty-four hours, for eight days successively; then you take out your nuts; stick in some of them cloves and slips of orange-peel, and infuse them for six weeks in brandy; after which time you take out your nuts, or pour off the brandy, and dissolve, in fresh water, sugar or cassonade: to this syrup put the brandy, and, both being mixed, pour it through your filtering bag, and your ratifia of nuts is made.

Receipt for the Nut Ratifia.

HAVING a thousand nuts prepared, boiled, and stuck with spice, as directed, and put into a stone jar, three parts full, you fill the rest with brandy; and having poured off the brandy, to ten quarts of that liquor, dissolve five pounds of sugar in ten quarts of water, putting it in the brandy you have taken from off the nuts: strain it through your filtering bag, and then put it up in bottles.

Of the Ratifia of Quinces.

To make this ratifia, you make choice of the best and finest quinces you can find: they must be ripe and fresh gathered; of a yellow colour, without spots. Having picked them out to your liking, you, with a clean linen rag, rub them all over; then grate them on a grater, to the pith of them; (care must be taken not to touch the kernels) your fruit being grated, let it ferment for twenty-four hours; then press it in a strong white linen cloth: pour it through your filtering bag; and, having dissolved the sugar therein, pour it into your brandy, and put to it the spices, &c. as to other ratifias.

This being done, strain this mixture again through the filtering bag; and being thus cleared, put it up in bottles, taking care they be well corked, and secured with sealing-wax, or pitch: thus put them in a cellar, letting them stand for two or three years; for the more age this ratifia has, the more perfect it will be.

RECEIPT.

To twenty quarts of juice of quinces take six pounds and a half of sugar, six quarts of brandy, four quarts of spirits of wine, and as much spirits of spices as you think will make it rich.

Another Receipt.

TAKE, to twenty quarts of juice, ten quarts of spirits of wine, fifteen pounds of sugar, ten quarts of brandy, and of spirits of spices as much as you think proper.

Rennet-apples, and the little muscatel-pears, are very fit for making ratifia, in the same manner as that made of quinces; the difference is this, that the ratifia made of rennet-apples and muscatel-pears is fit to be drank in three months; whereas, that of quinces requires three years before it comes to perfection. In the same manner you may make ratifias of any sort of fruit that affords a pleasant flavour from the juice.

Ratifia of Plumbs.

To make this ratifia, choose the ripest plumbs you can find, and such as contain the most juice; gather them in a dry and warm day, and, as soon as gathered, crush and bruise them, and, in a strong linen cloth, press out the juice, in which you dissolve the sugar, without putting water to it. The sugar being melted, add the brandy or spirits of wine to it, in such quantity as you think will make it good, or according to the price it is to be sold for. To this ratifia you use no spice, because that would take off the flavour of the plumb, which, by its odour, excels all the spices you can use. You then strain it through a filtering bag; and, when clear, put it up in bottles, closing them carefully with corks and sealing-wax, to prevent the evaporating of the flavour. Thus secured, you put them in your cellar, for at least six weeks before you drink it.

In this manner you make ratifias of other sorts of plumbs, among which the green-gage is the finest; care being taken they be full ripe, and fit for your purpose.

An excellent Ratifia of Seeds.

For this you take six sorts of seeds; viz. anise, fennel, angelica, coriander, carrot, and kimmel-seed. To make the ratifia of these seeds, you must observe the following directions:

Put the before-mentioned seeds in a clean earthen or stone vessel, and pour brandy on them; cork it well, and shake the infusion, once in eight days, well about, repeating it for six weeks successively; after which time, pour it through a hair sieve: dissolve sugar in brandy that is separate from your infusion, without water; stir it about, every day, till the sugar is melted: in the mean while, keep the vessel closed up, to prevent the evaporation of the volatile spirits. The sugar being dissolved, mix it with the infusion, and pour it through your filtering bag. If you will have this ratifia of a reddish tincture, you make it of damask-roses.

RECEIPT.

Take, to twenty quarts of ratifia, twenty quarts of brandy, six ounces of anise-seed, six ounces of fennel-seed, six ounces of coriander-seed, three ounces of angelica, three ounces of carrot, and six ounces of kimmel-seed. Observe you keep some brandy back from the infusion, to dissolve your sugar in.

Of essential Oils.

THE oils we now are treating of are the bases of perfumes, from the almond, ben-nut, filbert and hazel-nut. We shall first give some account of these fruits, and then shew how to extract the oils from them.

The almond is the fruit of a tree well known by the name of the almond-tree; the fruit is in the beginning green and woolly, which contains its seed in a shell: on some of these trees it is sweet, and on others bitter.

The ben-nut-tree grows in Arabia: the kernel of the nut ~~is used by~~ the perfumers, to extract an oil from. Of itself it has no smell, but is very well qualified to receive any odour we have a mind to give it, and retain that virtue a long time. The perfumers mix this oil among their pomatums, and it is excellent in clearing the face from spots and freckles. The distillers make an oil from these nuts, to mix with odoriferous essences.

The filbert and hazel are so well known as to need no description: the oil is made use of for odoriferous essences.

To make the oil, we break the shell of the nut, and taking out the kernel, grind or bruise them in pieces; we then put them in a strong linen cloth under the press, and press out the oil, without the help of fire. If you do it by fire, you put the kernels bruised into a pan over the fire; and when you find them sufficiently hot, and the oil begins to distil from them, you put them, wrapt up in a cloth, under the press, and proceed as above.

A Perfume for the Hair, from Blossoms.

To make this oil or essence, you must be provided with a box of tin, about one foot and a half square on each side, and about one foot high; one side whereof must be provided with a slider, so as to open or shut at pleasure: the top of this box, which is about the middle of its height, has likewise a plate of tin, with small holes in it, close to one another. If you intend to make several kinds of essences, you must be provided with several such boxes.

You then take a new cotton cloth, which, being laid four-fold together, may cover the inside of your box. Your cloth being folded, dip it in ben or nut-oil, and lay it on the plate within the box.

Now, in order to perfume the oils that are in the cloth, you may use what blossoms you please, that have an agreeable odour; as the jonquil, the Spanish jessamine, the little jessamine, the lily, the tuberose, the pink, the orange-blossom, the lily of the valley.

Having pitched upon a blossom, and gathered it fresh, you lay the same upon the cloth with oil, covering it all over. Then take another cloth, oiled in the same manner, and lay it on the blossoms, and let it thus remain for twenty-four hours; then you take off the upper cloth, and put another layer of blossoms on the former, repeating it in the same manner, every day, for eight or ten days together.

The oil that drops through the holes is at first perfumed, which you put up in a flask. After which, you lay both the oily cloths, with the blossoms between them, under the press, and press out all the oil contained in them, and put it to the rest in your bottle or flask, which you let stand for some time to settle, and then decant off the clear, into another flask; thus your essence will be ready. Besides the above oils, you may, for want of them, make use of sweet oil of olives, which will answer your purpose nearly the same as the others.

Perfumed

Perfumed Essence, for the Hair, which is extracted from Sweet-almonds.

THE almonds, being deprived of their oily substance by drying, are reduced to a powder, whereof is made a paste, which is used for washing of hands, and is called by the perfumers, the *Provence paste of Almonds.*

In preparing this paste, you take prepared sweet-almonds, which you beat in a mortar to a fine powder, sifting it through a fine hair sieve; what remains, you pound again, and make all to a very fine powder.

You then must be provided with one or more tin boxes, in the form and shape of those mentioned in the foregoing article. Upon the plate with the holes in it you lay your blossoms intended for the paste, covering the same all over; then strew on them a layer of your powder of almonds; then, covering your box close, you let it stand for the space of twenty-four hours.

After which, you take out the blossoms, with the powdered almonds, and put them into the sieve, and searching them through it, you separate the powder from the blossoms. This done, you proceed again as before, putting the powder over a fresh layer of blossoms, letting them stand again for twenty-four hours: this you repeat for eight days together; which time being expired, you put your almond-powder into a new strong linen cloth under the press, and having skrewed down the same, you let it stand for about three hours, and the oil will empty itself from it, and be compleatly perfumed; this you put up in a vial, or any other glass utensil, closing it well, and letting it stand for some time to settle; then pour off the clear into another vial. This is the method made use of for the essence from sweet-almonds, for the hair.

Concerning the paste, you have no need to fling it away, but, when dry, put it into a mortar, and reduce it again into a powder; put the same into stone jars, close covered, to prevent the effluvia of the odour from dissipating. When your dough is thoroughly dry, it is compleat, and will retain its volatile odour: you may sell it for *Provence* paste.

What is here advanced concerning the oils and essences for perfumes, has no relation to what has been said concerning oranges and other peeling-fruits, that afford a rich quintessence for perfuming oils. You have had sufficient instruction how to proceed with them.

Of Syrups.

How to make the Syrup of Maidenhair, called Capillaire.

It is a matter of consequence for a distiller to learn the making of syrups, since he may frequently reap much benefit by his knowledge.

The most useful syrups are those that have a pleasant and delicious flavour; those of the contrary belong to the apothecaries. Among the former, the syrup of maidenhair has of late been in great esteem, and is frequently, in the summer-season, called for by gentlemen at the coffee-houses.

Having made choice of a quantity of maidenhair, you put it with water into a kettle to boil; when you see your infusion of an amber-colour, and the herb has had a sufficient decoction, then pour it through a sieve, and let the maidenhair drop out. The mean while, clean the kettle, and put into it your sugar, together with the water the maidenhair was infused in. Put the kettle on the fire, stirring the sugar till all is melted; then put in the whites [illegible] eggs, which before you have brought to a froth with a whisk, and a little water with them. Your sugar and water boiling, put part of the whites of eggs into it, waiting till the froth rises, and hangs to the eggs, which then swim on the surface; then scum your syrup; this done, put more of your whites of eggs, prepared as before, into the syrup, till it yields no more froth, and is quite clear: in this manner you scum it, and let it boil, till it thickens to the substance of treacle: when your syrup is boiled enough, you pour it through a hair sieve into some earthen vessel, and let it cool, and then put it up in flasks or bottles. This is the true manner of making the syrup of Maiden-hair*.

Of Orgeat, or Almond-syrup.

THIS is a syrup very much in vogue, and is in many houses held in more esteem than the paste, which requires abundance of labour and pains in the making. For although the paste is, in some degree, preferable to the syrup, yet the latter is more commodious for use, and retains its virtue much longer; indeed the paste, when it grows old, becomes dry and sour: besides, you are obliged to sift it through a hair sieve, when you make your orgeat, or strain it through a cloth before you drink it; when, on the contrary, taking a certain quantity of the syrup, and mixing it with clear water, your orgeat is ready, and fit to be drunk.

To make the syrup, you take Provence-almonds, that are not above a year old, fresh opened: you may know them by their colour; for when fresh, they are commonly more plump, smooth, and not much pitted or scarred.

In the next place, you take, to each pound of sweet-almonds, two ounces of the bitter. These almonds you put into a vessel or pan, pouring on them boiling hot water, in order to blanch, or take the brown skin off them; when blanched, you put them, one after another, in fresh water: when you have done peeling them, take them out of the fresh water, and pound them in a mortar; then on a smooth stone work them further with a rowling pin, adding, by degrees, a little water to them, as you do in making of dough: this will prevent your almonds turning to oil. Your dough or paste being thus far ready, thin the same with a little water, strain it through a hair sieve, pressing it hard, in order to bring out the substance; and as there may remain much in your paste, thin it a second time, and, if requisite, a third time, so as to leave no good remaining in it, observing that every time you add but a little water, that so the milky liquor may be thicker. When this is done, you make your syrup of pure water and sugar, which you boil till it begins to candy, you then put in the milk of the almonds, letting it boil together, and stirring it well at the first boiling: when you perceive your syrup to be of a proper consistence, take it off the fire, and set it to cool, stirring it, to prevent its rising too much. When cold, put it, thus stirring it about, into a jelly-pot, or earthen vessel. If your syrup is to have the smell of orange-blossoms, then put to it some of the distilled water: thus you may give it what scent you will, with any other of the sweet-scented waters.

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* Some people flavour the above with orange-flowers; and others imitate Capillaire with orange-flowers alone. *Ed.*

Receipt for four Quarts of Orgeat-syrup.

TAKE seven pounds of sugar, one pound of sweet-almonds, two ounces of bitter-almonds, or four ounces of apricot-kernels, (because they are not so bitter as the almonds.)

In putting your sweet-scented waters to the syrup, you may use your own discretion.

Of Syrup of Lemons.

THIS syrup is as much in vogue as the former; and is, in many houses and families, used as a cooling liquor. To make this syrup good and well, you use such lemons as have a pretty thick peel, they must be clear from green spots, yet not thoroughly yellow: if they are too green, they are not so juicy; the juice is too sour, and not so good as when ripe; if too yellow, the syrup will be too sweet, not clear, nor have the agreeable tart flavour, in which the delicacy of this fruit consists. You peel the outward rind of the lemons, and boil them in water, and pour the decoction through a hair sieve, then you boil your syrup till you find it candy. You make this syrup with the water your peelings were boiled in. The mean while your syrup is preparing, squeeze your lemons, and clear the juice through a filtering-bag. Your syrup being ready, take it off the fire, pour your juice gently to it, and stir it well together. After this is done, let it cool, and put it up for use, in glasses, or earthen-ware. For want of lemons, you may use citrons, and proceed, in every respect, as directed above. Observe that the juice is not to be put into the syrup till it has done boiling, and is taken off the fire.

Receipt for four Quarts of Lemon-syrup.

You make your decoction, like that of [illegible], as you think proper. take the outside peeling of the fruit, with four quarts and a quartern of water, and seven pounds of sugar, and when your syrup begins to candy, take it off the fire, and put into it one quart of the juice of lemons, or citrons. The quantity of lemons or citrons cannot be well determined, because some fruit yields more, and another less.

Of the Syrup of Currants.

THIS syrup is made to supply the want of that fruit, which continues not above two months in a year fit for the use of its admirers, who find a great delicacy in its cooling and pleasant flavour.

To accomplish this, you take currants when in their prime, and full ripe; these you pick off their stalks; press out the juice of them; and, through a strong linen cloth, strain it into an earthen pan; you afterwards clear it through a filtering-bag, and, according to the quantity of juice, you add as much water to it: after which, you put your sugar into the mixture, and clarify both over the fire.—But if you make use of cassanade, then you prepare your syrup first in pure water, and clarify it thoroughly before you put the juice to it.

This is the manner, and the right method of making the syrup of currants; and although the instruction is short, yet there is nothing omitted. It must be made with great attention, and according to these rules prescribed, else you will miscarry in your labour.

Receipt for four Quarts of Syrup of Currants.

Take seven pounds of sugar, two quarts and a half of water, and two quarts of currant-juice: after which, clarify your syrup with the white of eggs, as usual.

Of Syrup of Violets.

Of all the blossoms fit for making of syrups, none is in more esteem, and more made use of, than the violet. The syrup made of this blossom has its own property, with respect to its beautiful tincture, of which all others from their own quality fall short; it retains not only its natural colour, but likewise the agreeable flavour and smell, and is made use of on many occasions in medicine:—it is very difficult to make.

You gather your violets in the beginning of the spring, which is the best time: you make choice of single ones for that purpose; the double ones are only fit to extract their colour. Gather them in the warmest and driest time of the day; and, after you have separated the green parts from them, put the leaves of the blossom into a little water, in a pipkin that stands upon hot embers. Take care not to let the infusion boil, else the colour will turn green; therefore, you must take particular care to let your fire be moderate.

Your infusion being made, as has been directed, strain it through a sieve; then, having boiled your syrup till ready to candy, you take it off the fire, and let it run through a sieve, which you hold over the pan with the infusion, that they may be both mixed together: when cool, you put it up in jelly-pots, or glasses. Take particular care the syrup be put in whilst the infusion is warm.

Receipt for four Quarts of Syrup of Violets.

TAKE seven pounds of sugar, four quarts of water, three or four eggs (for clarifying,) and two pounds of violets, to produce only one quart of decoction. The syrup would not be of a body sufficient to withstand a ferment, if it were thinner.

Of Syrups in general.

THE several syrups whereof we have communicated the receipts, are sufficient to qualify such as have a mind to prepare or make any other, observing the rules given to each particular sort. The orgeate syrup is a general instruction to such as make them of the nut kind, and of cooling kernels or seeds: the syrup of Maidenhair is a rule to such as make them of herbs. The syrup of currants teaches the manner of making syrups of all red fruits, as the mulberry, black-cherry, and the like; and the lemon-syrup informs them how to proceed with making the same of such fruits as the Bergamot, the cedra, and

Portuguese oranges; so that in all, they have a method and rule of proceeding.

If you prepare a syrup of white blossoms, you make an infusion, or a decoction; that is, you take your blossoms, boil them in water, and, having poured the said decoction or infusion through a sieve, you make your syrup by the addition of sugar.

If you want to extract the colour from certain blossoms, then you follow the method set down concerning violets. They must be infused over hot embers, or a moderate heat: this is the main article to be observed, if you will preserve their colour and odour.

When you make syrups of certain roots that are proper for medical uses, you scrape and wash them clean; split them asunder, and let them boil. The liquor wherein they are boiled will serve for your syrup.

There is no certain rule to be given for making the different sorts of syrups; some make use of more, others of less, ingredients: practice will soon inform any person of judgment how to proceed in his choice of the quantity, and of the time of infusing or boiling them.

Of Infusions.

INFUSIONS (with which we shall conclude this subject) have been treated of in several foregoing receipts: they were made use of before the distilling of liquors was well known, and commonly done in spirits of wine, which method is still observed by many people: and although distillation is far preferable to infusion, yet the latter ought to be well known and practised, on several accounts; first, for the satisfaction of such as have an aversion against distilled liquors, who have a notion, that all that goes over the helm is destructive to health; —2dly, as it is an essential part belonging to the art of distilling; —3dly, as it is a means for procuring things in such places where no utensils for distilling are to be had:—And, lastly, as thereby we may perform all that, without apprehension of danger, which we cannot draw over the helm, where, of necessity, recourse to infusion must be had.

By infusion we understand a steeping of any kinds of drugs, roots, leaves, &c. in some liquor proper to draw out their virtues.

There are several infusions made for syrups, and medicines in water; some are made in wine; others are infused in brandy, and spirits of wine, for strong liquors and ratifias.

The ingredients are put into a vessel that can be well covered and enclosed. They are either pulverized, cut, or left whole, in the same manner as though they were to be distilled, they are continued in infusion for fourteen days, a month, six weeks, or two months, and shook about every two or three days, whereupon, the liquid is gently poured off the ingredients, and then mixed with the syrups prepared for that purpose by filtering through the filtering-bag. The infusion of spices will be performed in eight days: others, for extracting of colours from blossoms, require only twenty-four hours. The aromatic herbs are infused in brandy.

Formerly, infusions were set in the sun; others put them over a fire, not knowing that the fire is too strong, and liable to give the infusion a disagreeable flavour, and diminish the spirits. The right method for making infusions is to put them in cool places, except it is for extracting the colours out of blossoms. We have given sufficient receipts, whereby the practitioners may avoid the wrong methods made use of by such as know no better.

PART X.

THE
ART OF ANGLING.

ANGLING, among sportsmen, is the "art of catching fish with a bait, hook, and line attached to a pole, or rod."

One of the most material parts of an angler's business, to attract and lure the fish to a convenient spot for angling. This he may do, in standing waters, by throwing in brewer's grains, chopped *worms*, and the like: but the chief difficulty is in deep rapid rivers and brooks. The best method, in this case, is to get a tin box, with a cover, capable of holding a vast number of worms, which may be allowed to crawl out at holes *bored* of a fit diameter through every part of it. By a leaden weight it may be sunk, and be drawn back again, at will, by a pack-thread purposely affixed to it. Probably, if fish be plentiful when the box is thrown in, the angler's sport will soon commence, otherwise, a pike may be suspected on the spot. Bait a hook, therefore, properly for him, and remove him, if possible from the place. Should you remove him, your plan will succeed, and you may throw in, your baited hook and line a little beyond the chosen spot, running down the stream, and passing a short way over it; when you are again to return as before. Let the angler be properly screened from view, having the sun facing him, that his shadow may be thrown behind, on the earth.

When *paste* is used for a bait, it should be mixed with a little cotton-wool, and rubbed over with honey: some anoint it with butter, to keep it, as they suppose, firmer on the hook. The eyes of any fish that is caught, make an excellent sort of bait for almost any other kind of fish.

The best way of using a *fly* is down the stream, but not up. If trout are angled for, the *fly* need not be thrown above four or five times in the same place, for they will seize it in that time, or not stir at all.

Choose a place, if angling in a pond, where cattle are accustomed to drink.

In case your hook should get affixed to a stump, or be entangled in the weeds, you may readily release it by a ring of lead, somewhat heavy, about two inches in diameter, and fastened to a pack-thread, which being gently dropped over the line, will be guided to the hook, and be dexterously twitched from its hold.

Fish do not like to be disturbed by wind and weather, which is the reason why they are usually found in deep water.

Sluices and mill-dams are favourable places for angling at, (but on this we shall be more particular, under the several heads of each select fish).

From April to October is the choicest season for angling, for the fish will not readily bite in cold and stormy weather. The best time of the day is, generally speaking, from three in the afternoon till sun-set; or, in the morning, from three till nine. Southerly winds are the best, with a warm but lowering day: the easterly winds bring little sport. A gentle wind, after a shower, is of great service, by troubling the water. In summer, a cool day is best; but in winter, a warm day. A cloudy day, after a bright moon-light night, usually brings excellent sport, as the fish do not like to prowl after food at moon-light, and are, therefore, hungry and snappish on the following day.

We shall now proceed to lay before the reader such brief rules* as will suffice for an introduction, leaving the rest to be supplied by practice and experience.

ANGLING IS PERFORMED BY MEANS OF RODS, LINES, HOOKS, FLOATS, AND BAITS

Of Rods.

FISHING-RODS, which are poles and wands to which the lines are fastened, are of several sorts. 1. A troller, or trolling-rod, which has a ring at the end of the rod, for the line to pass through when it runs off a reel. 2. whipper, or whipping-rod, a top-rod, that is weak in the middle, and top heavey, but all slender and fine. 3. A dropper, which is a strong rod, and very light. 4. A snapper, or snap-rod, which is a strong pole, particularly used for taking the *pike*. 5. A bottom-rod, being the same as the dropper, but somewhat more pliable. 6. A sniggling or proking stick; which is a forked stick, having a short strong line, with a needle, baited with a lobe worm this is only for eels in their holes.

Here follows a useful description of the manner of

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* Those who wish to enter elaborately on the study of Angling, must apply to Sir John Hawkins's edition of Isaac Walton's Angling, in 8vo.—*Ed.*

Making

Making of Whipping-Rods.

THE fittest kinds of wood for this purpose are the hazel, black-thorn and white-thorn, which must be gathered about the end of December, when the sap is gone down and properly condensed. With a sharp knife cut off all the twigs and knots, while the wood is yet green, and scrape off the bark from the black and white-thorn, with the back of your knife, but the bark of the hazel must be left on. Having thus far prepared your wood, place it in a chimney-corner, where a constant fire is kept, and there let it remain for the space of a week. When it is sufficiently dried, rub those parts from which you cut the twigs and knots with a sand-stone or a fine file, till you have made the whole smooth and even. You must be particularly careful that the pieces are perfectly straight, and, if they should not be so naturally, they may be made so by laying them for some time over a slow charcoal fire, and placing them afterwards in a thick board with holes in it, such as we see in the cane-shops: the several joints, also, must be made to tally exactly with each other. The rod is usually formed of three joints, distinguished by the names of the but or stock (which is the largest, and is held in the hand) the middle-piece and the top: the length of the rod depends wholly upon that of the line, but I commonly use one of which the three joints are each about a yard long, and may, consequently be concealed under my coat when I am so inclined. With a rod of this size I can throw and deliver a line twelve or fourteen yards long, which is a sufficient length for the New River, or any other river of which I have knowledge. The joints must be fitted to each other, being previously cut for that purpose, the but to the length of about three inches, and the other two each proportionably less, from the smallest end, and they must be fastened together with shoemaker's wax, and then tied over with thread doubly waxed with the same, or, if in the winter, with good bees-wax; remembering that the thread which fastens the but to the middle-piece, must be stronger in proportion than the rest. To the end of the top-joint fit a piece of white whale-bone, which you must bind to it with fine silk, waxed as above. Instead of a loop of hair, use one of brass wire, and you will then never be in danger of your line loosening from the rod. According to the length of the line you fish with, your rod must be either more or less taper. Besides the woods mentioned at the beginning of this article, hawthorn and elm (the young shoots of each kind of wood are to be preferred) make good tops, and the crab-tree is excellently adapted to the making of buts. Sticks of a proper length, and in every respect fit for making rods, are at all times to be met with in the shops of those who sell cane

Of Lines.

FISHING-LINES are of three sorts—viz. of horse-hair twisted, of greenish, water-coloured silk twisted, and of a foreign article, called Indian grass.

Some people prefer the three colours of sorrel, white and grey; the two last for clear waters, and the first for muddy ones.

The pale water-green colour may be given to hair, by steeping it in a liquor made of alum, soot, and the juice of walnut-leaves, boiled together in water.

How to make curious single-haired Lines.

HORSE-HAIR, either from the mane or tail, and goat's-hair best answer this purpose. They should be of a white or pale dun colour, exceeding fine, transparent, perfectly round, and free from knots. To judge of the goodness of the hair, you must stretch it gently to its full length, but remember to avoid the too common practice of wetting it; as a rotten hair when wetted, will frequently bear stretching with one of the best quality. The hook is to be fixed to the small end of the hair, with a piece of fine waxed Belladine silk; but, when you are become a thorough proficient in the method of fastening it on, you should make use of a hair instead of silk, which is apt to rot in the water: a learner should also choose a large hook and thick line for this purpose, in preference to those of a smaller and finer size. Hold the hook in your left hand, with the bent part between your fore finger and thumb, and the end of your line lying exactly under the shank part: then pass the silk several times round the line and the hook, beginning at the shank and ending near the bent part, and, with what remains of the silk, make a noose or slip knot, which you must pull close to the hook, and then cut off the jagged end of the line. If you are inclined to lengthen your line, you must take another single hair, and lay one end of it under the end of that to which the hook is fixed, leaving a length of about two or three inches. Then, turning the hairs into the form of a bow or circle, pass the ends through twice, and draw them quite close; after which you may cut off the loose hair that remains, but at a proper distance from the knots.— This is called the *water knot*, and is the best of the kind for a single-haired line. By this method you may extend your line to any length you please, according to the depth of water in which you propose to angle; observing always that the hair which is fixed to your rod, though of a certain degree of fineness, must still be stronger than any of the others. When you fish with paste, the distance between the float and the end of your rod must not be more than twelve inches, to enable you to strike true. In small rivers you may angle with a fine-haired line; but in such places as are infested with reeds, or where the fish are of a larger size, you must use the roundest and strongest hairs you can procure, otherwise you will be liable to lose your line with every bite. He, however, who fishes fine, in which the chief art of angling lies, has far the best prospect of success. Your shot must be of a very small size, cleft in the middle, and fixed to your line at the distance of about six inches from the hook: you must likewise remember always to make a noose at the upper part of your line.

Of Floats.

FISHING-FLOATS are little appendages to the line, serving to keep the hook and bait suspended at the proper depth, and discovering when the fish has fast [illegible]. Of these there are divers kinds; some made of a Muscovy-duck's quill, which are best for slow waters, and others, more suitable to strong streams, made of good sound cork, without flaws or cavities, cut smooth and pyramidal, with a hole bored through its longitudinal axis, by means of a red-hot iron; into this hole is to be thrust a quill of corresponding diameter: they may be dyed or not, according to your fancy. The composition used for the purpose of dying is the dust of Brazil-wood, boiled either in fair water or urine, which gives them a beautiful red colour. Before the liquor grows cold, you must throw in a small piece of roach alum, in order to fix the colour. Cut off the ends of the quills with great care, that your floats may match with the utmost exactness, and put the ends thus cut off one within another, after you have rubbed them thoroughly with warm shoemaker's wax. You may likewise make plugs of wood, both for the single and double plugged floats, rubbing them over with wax, as above, before you fix them in the quills. The double-plugged floats are best adapted for angling in the New River, which abounds with bleak; a fish particularly troublesome to paste-fishers, by snatching off the bait before it reaches the proper depth, the single-plugged float will be of most service in angling there. The latter of these floats requires but one shot to be fixed to it, but to the former you must use several, in proportion to its size. Having thus instructed you, to the best of my abilities, in the method of making your own tackle; but, if you should prefer buying it from the shops, you will there meet with it in the greatest variety, and of the best quality.

Of Hooks.

A FISHING-HOOK is a small crooked instrument made of steel-wire; to retain fish that have caught at the bait. It ought to be long in the shank, in general, and somewhat thick in the circumference, with the point even, straight, and well barbed. Let the bending off be in the shank. For setting them on, we shall just briefly remark here, that small strong silk is to be used, laying the hair line on the inner or curved part of the hook, for if it be on the outside, the silk will fret and cut it asunder. There are several sizes of these fishing-hooks, some of which have peculiar names, as, 1. Single hooks. 2 Double hooks. 3. Snappers, or gorgers, which are hooks to whip artificial flies upon, or to bait with natural flies 4. Springers, or spring-hooks, a kind of double hooks, with a spring which flies open upon being struck into any fish, and so keeps its mouth open.

Of Baits.

THE baits employed in angling are extremely numerous they consist of varieties of flies, pastes, worms, fish and insects, most of which we shall enumerate in their respective orders.

Flies

Flies.

1. STONE-FLY, found under hollow stones at the side of rivers, is of a brown colour, with yellow streaks on the back and belly, and large wings; is in season from April to July. 2. *Green-drake*, found among stones by river sides, has a yellow body ribbed with green, is long and slender, with wings like a butter-fly, his tail turns on his back: from May to Midsummer he is very good. 3. *Oak-fly*, found in the body of an old oak (sometimes in the ash) with its head downwards, is of a brown colour; and excellent from May to September. 4. *Palmer-fly*: or worm, found on leaves of plants, is commonly called a *caterpillar*, and, when it turns to a fly, is excellent for trout-fishing. 5. *Ant-fly*, found in ant-hills from June to September. 6. *May-fly*, to be found playing on the river side, especially on the approach of rain. 7. *Black-fly*, to be found on every hawthorn, when the buds are off.

Pastes.

1. TAKE the blood of sheeps hearts; mix it with honey and flour, and work them to a due consistence.

2. Take old cheese, and grate it, adding a little butter to work, and a little saffron to colour it; in winter use the fat of rusty bacon instead of butter.

3. Crumbs of bread, chewed; or worked with honey or sugar, moiſtened with gum-ivy water.

4 Bread, chewed, and worked alone by the hand, till stiff.

5. Dough of flour and water, scented with gin and oil of spike-lavender, with, or without, a small quantity of vermilion to colour it, and a little cotton wool to make it hold on the hook.

6 Whole

5. Whole grains of malt, gently boiled, so as to soften them without bursting: these are an excellent bait for roach and dace, if the spot be previously baited with ordinary fresh-brewed grains.

Worms.

1. The *earth-bob*, found in sandy ground, after ploughing, it is white, with a red head, and bigger than a gentle. another sort is found in heathy ground, with a blue head. (It is this worm for which crows and rooks follow the plough in such flocks.) Keep them in an earthen vessel well covered with a due quantity of the earth they were found in. They are excellent from April to November.

2. *Gentles*, generated from putrid sheeps' trotters, and flesh: lay them in bran a few days before they are used.

3. *Flag-worms*, found in the roots of flags, they are of a pale yellow colour, and longer and thinner than a gentle, and must be scoured like them.

4. *Cow-dung-bob*, or clap-bait, found under cow-dung from May to Michaelmas: it is like a gentle, but larger. Keep it in its native earth, like the earth-bob.

5. *Cadis-worm*, or cod-bait, found under loose stones in shallow rivers: they are yellow, bigger than a gentle, with a black or blue head, and are in season from April to July. Keep them in flannel bags.

6. *Lob-worm*, found in gardens; is very large, has a red head, a streak down the back, and a flat broad tail.

7. *Marsh-worm*, found in marshy ground. keep them in moss for ten days before you use them. Their colour is a bluish red, and they are in season from March to Michaelmas.

8. *Brandling red-worms*, or blood-worms, found in rotten dunghills and farmers' bark: they are small red

worms, and excellent for all small fish; they have sometimes a yellow tail, and are then called tag-tails.

Fish and Insects.

1. Minnow. 2. Gudgeon. 3. Roach. 4. Dace. 5 Smelt. 6. Yellow frog. 7. A Snail, slit. 8. A small Grasshopper.

Besides the above bait, the ingenuity of man has contrived to imitate the above baits with such truth and exactness as to deceive the fish, and answer the conveniency of being portable, cleanly, and constantly attainable. Of the manner of which many of them are made, some account will be given hereafter.

We have introduced plates XX. and XXI. for the purpose of furnishing the angler with an epitome of that agreeable recreation, in a portable compass, fit for the pocket. A portrait of each ordinary river-fish with which the sportsman is likely to meet, is engraved on the margins of the plates, to render the whole more complete.

Instructions for Angling with Paste and Worms.

Before I proceed to lay down rules for becoming a proficient in this agreeable art, I must beg leave to observe to the young beginner, for whose use this is particularly calculated, that he must not lose sight of those two capital requisites in an angler, patience and perseverance, nor suffer himself to be at any time discouraged by the want of success, or disgusted by the good fortune of those who may be manifestly his inferiors in skill.

The season for angling commences in June, and the proper hours are the dawn of day, and three o'clock in the afternoon, at which times the fish in the New River, ponds, and small rivers, are accustomed to feed; which places I recommend to the learner to make his first essays in. His rod should be from twenty to twenty-four feet long, and so contrived as to be put into a bag, when taken to pieces; both for the conveniency of carriage, and for the sake of the additional strength of the joints. It should be perfectly straight, sufficiently, but not too taper, and not top heavy: the but should be of dogwood, and the other joints of white cane, unstained, with two or three tops of the same wood, and one top thicker than the rest, and strengthened in different parts with white whalebone, which is tougher and less brittle than the black: the slenderest tops are to be used in angling for roach, and those of the largest sort for perch, carp, chub, or any fish of a similar size: but when you fish in small rivers, you will find a rod consisting of three joints only to be of a sufficient length. Having first washed your hands, you may proceed to make your paste in the following manner: take the crumb of a roll, one day old; soak it in warm water, or milk, till it is thoroughly moistened; then, having pressed out all the liquor, knead it with your thumb into a proper consistence, neither too stiff nor too moist. To this you may add a small quantity of mild Cheshire cheese, finely grated. For this purpose warm water is preferable to cold, as it gives the paste a better consistence, and causes it to stick the more firmly to the hook. A useful paste may also be made, according to the foregoing directions, with the best white household bread; omitting the cheese, if you chance to have any antipathy to that kind of food. Naples biscuit likewise makes a very good paste. You must provide yourself with a good quantity of crumbs of bread for ground-bait, which, after being well chewed, you must throw into the water, in very small bits, every two or three minutes, otherwise you may over-feed the fish, and so have but little sport. A westerly, or a south-westerly wind is the most favourable to anglers; and this circumstance must be strictly attended to in the winter season, [illegible] is of little or no consequence to your sport [illegible] of the compass the wind may change to [illegible]. As soon as day-light appears, repair to your post, and having plumbed your depth, to within half an inch [illegible] of the bottom, of which you will be enabled to judge by your float's sinking wholly under water to the above depth, you may then bait your hook with a very small bit of paste, and begin to angle: making use of the whole length of your rod: it will be proper to furnish yourself with two plummets, lest by any accident you should lose one of them. You must also observe to keep the most profound silence whilst angling, as you will otherwise greatly hinder your success. Throw in three or four lumps of your ground-bait exactly on the spot where you plumbed your depth; first chewing it to a proper consistence. When you observe your float either to sink, to mount higher than ordinary, or to fall sideways on the surface of the water, in any of these cases you may conclude that you have a bite, and must strike smartly, or, with a quick motion of your wrist only. In fishing for bleak, you must use a small line, single-plugged float, and a loose-hook; but not one of the smaller size: the most proper depth is from twelve to sixteen inches below the surface. For roach-fishing a larger line is required, with float and hook proportionable. Having hooked either a roach, chub, dace, or any other fish of a like size, instantly raise the top of your rod nearly to a perpendicular, at the same time inclining the but-end gently towards the ground, but without touching it. Be not too much in a hurry to see your fish, but keep him under the [illegible] or bent of the top of your rod; play him deep, and, when he is wearied and spent, he will rise of himself to the surface, lying flat on his side, and may thus be easily taken out, either with a landing-net or with your hand. By a proper attention to these rules, you may *drown*, in the language of anglers, the largest roach, dace, or chub.

Observe [illegible] and [illegible] and is to be made [illegible] in warm water, which [illegible] put to it, and as much bran [illegible] meat [illegible] bread as will make [illegible] a proper [illegible]. In every piece of this bait which you use, put a [illegible] a proper size, to prevent its being carried away by the stream when it reaches the bottom: some [illegible] they angle in the Thames, or in any other [illegible] which has a strong current. Graves, an article sold by the tallow-chandlers, is also a favourite ground-bait with some persons; but I never used it, except [illegible]. To take these fish, you must have a very strong rod and line, with a bullet at the end, and a large hook, well-bearded, and baited with a good sizeable lob-worm, or a lump of gentles: the line should be made of [illegible], neatly twisted together, and whipped with a piece of waxed silk, and a hook of the right Kirby kind, full-sized, whetted quite sharp at the point, and fastened to the end of the line, either with a strong single hair, or a fine link of silk-worm gut, or Turkey grass. These fish are frequently taken in the parts contiguous to London-bridge. In this part of the Thames, if you angle for large roach or dace, your bait must be gentles; but higher up the river, about Staines and the places adjacent, you may use indifferently both gentles and paste, either in summer or winter. As the fish are, in general, larger, and the current more rapid in the River Lea than in the New-River, the line which you use in the former must, consequently, be stronger and of a greater length, and your [illegible] than those which serve for angling in the latter; [illegible] ground-bait must be made of bread mixed with bran, with a stone in each piece, to keep it at the bottom.

On [illegible] Fishing.

THIS fish, like the salmon, is to be found in rivers that communicate with the sea, and like them come to spawn in the freshes, but never go further than the tide runs, and return to sea in the summer months, being in season from November to May, or longer if the weather is cool.—They are to be fished for in eddies, sterns of ships, lighters, the end of logs, and in London at Perry's dock, Limehouse, Rotherhithe, &c. &c. They very seldom are angled for above London, or Rochester bridges (above bridge, as is termed.) The best time for them is at up-tide, till one hour after high water. Your bait should be pieces of small eels, about the size of a grey pea, or one of their own species cut in the like manner. Your line should be strong gut, about fourteen feet, with six or seven hooks on, and fish at bottom, the largest being there.

Rules for Angling for Carp or Barbel.

THE *Carp* is a fish that will teach an angler the value of patience, as he is endowed with extraordinary policy.

The *Barbel* (so called on account of the barb or beard that is under his chops) will also give considerable exercise to the sportsman's ingenuity.

The season for catching these sorts of fish is the month of July, and the proper hour, that of day-break. You must provide three very long rods, having strong tops, and with lines of a length proportioned to your rods, made of Indian twist, or strong pearl-coloured silk, and with full-sized Kirby carp-hooks, armed at the bottom links with sea-grass, Turkey grass, or strong silk-worm gut, perfectly free from knots or frettings. Before you begin to angle, put the hook between your teeth, and, after rubbing the foot-link [illegible] thumb of your right [illegible] degree of heat for the [illegible] as pos- sible; and this method you will find [illegible] that formerly in use, of [illegible] must remember, in angling [illegible] to use [illegible] nor shot. Carp, indeed, [illegible] for their [illegible] and subtlety. You will find those in the New River [illegible] ponds, too well fed in general (particularly if they are a good size) to bite at your bait, unless great art and in- dustry are put in practise to lure them to it. Having fixed on the spot where you propose to angle, repair thither over night, and throw in a good quantity of paste made with bread and bran, or of the same mixed with lob-worms, chopped in small pieces.

Blood, mingled with grains, will also answer the purpose very effectually. A few large pellets of white paste must be thrown in also, and you must not fail to mark the spot with the utmost attention. This method you must pursue for three successive nights, otherwise you must think your prospect of success will be but small. Begin to angle at break of day, having first plumbed your depth to the greatest exactness. Your bait for your first rod, which bait is to lie at the bottom, must be a well-scoured lob-worm, and you must pass the hook through its body at the distance of about three inches from the tail, that part being far more agreeable to the fish than the head; then throw in a further quantity of ground-bait, precisely on the same spot you baited on the three preceding nights, according to the directions given above. Having gently dropped the worm as exactly as possible on the ground-bait you have thrown in, lay your first rod on the ground, and proceed [illegible]; previously plumbing your depth to within [illegible] inches of the bottom. The bait for this rod [illegible] red-worms, properly cleansed, and transfixed through the head; which I have re-

peatedly

[illegible] one or other of the [illegible] sorts of paste, all of [illegible] adapted to this kind of angling: your hook, [illegible], must be of the short [illegible] kind. Take the crumb of white bread, one day old, and soak it in [illegible] milk, till it has imbibed as much as you judge necessary to render it of a due consistence; then press out all the milk, and add to the dough a proper quantity of honey, either yellow or white, to give a sufficient sweetness in flavour; you must likewise mix with it as much saffron, dried before the fire, and rubbed with your finger and thumb to a fine powder, as will tinge it of a colour something deeper than that of lemon-peel: three or four drops of oil of rhodium, which you may purchase at any chemist's or apothecary's, being added to the other ingredients, your paste will then be fit for immediate use. The other paste may be made nearly in the same manner as the foregoing, save that, instead of the honey, for sweetening your dough, you are to substitute loaf-sugar, finely powdered; and are to set aside the saffron and oil of rhodium. Large white or green peas also, well boiled, make a useful bait; but you must throw in a quantity of them, for three or four successive nights, on the spot where you propose [illegible]; otherwise you will have no sport. Your hook [illegible] baited with the paste in large pellets, the size of [illegible] of your thumb; as the fish in question are [illegible] and greedy. If, after an hour's angling, you [illegible] the carp will not bite at the [illegible] hook, and substitute one or other of the [illegible] pastes in their place. When you [illegible], of which you will judge by your float [illegible] along, as it [illegible] side, and then [illegible], as also by the [illegible] of the top of your [illegible] fish to draw your float under water, in which case you will infallibly hook [illegible] according to [illegible] of " [illegible] angling [illegible], if you [illegible] caution [illegible] tern[illegible] (that is, [illegible] Where [illegible] possible [illegible] either for carp or any [illegible], he [illegible] reel or winch to his rod, by which means he will [illegible] ally ward off any accident of the above kind. [illegible] for carp in a swift current or eddy, you should [illegible] lob-worm, or with a dozen gentles, if of a [illegible] otherwise half that number will be sufficient. Your line and hook must be such as I have already described in the former part of this chapter, and fix to your line a bullet, of a size so proportioned to the stream, as that it may incline to stop within a foot or eight inches of the bottom; but take notice that in this sort of fishing you [illegible] to make use of any float. Barbel, also, may be [illegible] in the manner here set forth. These rules, if [illegible] attended to, will be sufficient for the instruction of the [illegible] angler; although I could add several others, [illegible] comparable to the foregoing.

Particulars of the [illegible] of Angling for [illegible].

THE hot months [illegible] season for [illegible] fish, and you should [illegible] as soon as [illegible] appears. [illegible] them much in the [illegible] manner as for [illegible] and hooks, [illegible] with or without [illegible] the water [illegible] more or less [illegible]. The usual [illegible] the tail-part [illegible] cut to the length of two inches [illegible] scoured marsh-worm, a common red-worm, [illegible] gentles, and a piece of [illegible] paste; your [illegible] good size, particularly when you angle for the [illegible]. Some fanciful [illegible] in their writings on this subject recommending that the marsh-worms be dipped in tar-water, which is now greatly in vogue; but I have constantly rejected the method, as wholly useless if not prejudicial. If you have a mind to throw in some ground-bait over night, blood and grains will best answer that purpose. As tench generally bite with great freedom and boldness, a less degree of art and skill is consequently required for catching them, but the greater the number of rods and lines you employ on the occasion, the better will be your prospect of success, especially if they do not chance to be in a humour to feed at that time.

Rules for catching Perch.

These fish are taken at two different times of the year; the first season commences in February or March, when they are full of spawn, yet well-tasted, and the other in July or August. Gloomy weather, attended with mizzling showers, and a strong and blustering south or westerly wind, are most favourable to the angler in this kind of fishing. He should make choice of the deepest and most ruffled waters, and should repair to his post about ten o'clock in the morning in winter, and at sun-rise during the warmer season. His rod should be of a considerable degree of length, with a line something stronger than those which are used for [illegible]-fishing. If he angles for the smaller or middle-sized perch, he should furnish himself with a line made either of a strong single hair, of very fine silk, or lastly of Indian grass; but, if the larger fish are his object, the line must be of that sort which is formed of three hairs neatly twisted together: his hooks and floats also must be of sizes proportioned to those of the fish which they are designed to take; but, in angling for the small perch, he must use no float, one single shot only, and that sort of hook which is known by the name of the middle-m[illegible] usual bait fo[illegible] small [illegible] blood-worms, co[illegible]-worms, [illegible] and the tail part of a maiden dew-worm. These are to be used during the first season of perch-fishing; but towards the commencement of the latter season you must bait for the above-sized fish, either with gudgeons, minnows, or loaches, very small roach or dace, or the belly-part of those fish cut in pieces, small green and yellow frogs, bleak, which by their shining colours greatly attract these fish, or lastly, with a bunch of gentles: blood-worms, red-worms, and shrimps, boiled or raw, are the best bait, particularly for small perch. You must likewise angle at various depths, according to the season of the year, and the places you fix on for the scenes of your diversion. In winter you should plumb your depth to the distance of from one to four inches from the bottom, except near the sides of the New River, where you must plumb to the distance of about three inches. When you bait with any of the live fish abovementioned, you must run your hook under the middle part of the back fin, carrying it on till it has nearly reached the head of the creature, and carefully avoid the bone, lest you kill your bait, in which condition the perch would not meddle with it: some unskilful persons thrust the hook through the mouth of the bait, instead of pursuing the method here recommended. Having plumbed your depth and baited your hook, drop the line gently into the water, where it must be kept in continual motion, to entice the perch to bite. When this is effected, you must wait a minute or two before you strike, otherwise the fish will not touch the bait; but, after that interval, if you strike smartly you will seldom fail of hooking him. If these fish do not bite freely, you may disturb the bottom of the water either with a long rake or pole, or by repeatedly throwing in quantities of red gravel, with which you must be previously provided, together with stones and earth. Perch, however, are in general an undaunted fish, and require little pains to be taken to lure them to the bait. In angling for the smaller sort, you may sink your bait to the bottom; often dragging it along the ground; and now and then raising it to the surface.

Method of catching Crusoes, or Crucians.

THESE are a pond fish, and were scarce known in England till of late years, though they now are become very plentiful with us. They are of a species between the carp and the bream, and taste nearly as well as the perch. You must angle for them with tackle somewhat less fine than for roach, and with the same bait as for carp and tench. They are sometimes met with in the New River, of pretty large size and good quality.

Best Method of angling for Bream.

THERE is little difference in the rules for catching this fish and those I have already laid down for taking carp. Your tackle should be finer than what is commonly used for carp, and you should angle as nearly as possible in the middle of the stream, if in a river; and at the like distance from each side, if in a pond or lake; in which pieces of water also, this fish is sometimes found. He may be taken with a blue-bottle fly, either by whipping or in the common method, with paste or gentles.

An approved Method of Trolling, and Trimmer-fishing.

YOU should have a fish-kettle to keep your baits alive. First, in baiting your hook, be careful that you run your needle between the skin and fish, entering at the shoulder to the tail of your fish; for by tearing the bait, it soon dies and then becomes useless. Your hook must be a strong single one, the size of the trolling hook, tied to a strong gimp a foot long. Your line should be either a strong silk or a cord line, about thirty yards in length, with a loop at the end large enough to unloop a pike, or any other voracious fish: first, put on the bullet, to run free on your line: about two feet from your loop place a large shot, big enough to keep the bullet from the cork, in order that the cork may run free on the line one foot; at that distance place another shot, to keep your cork from interrupting your bait. Make the other end of your line fast round the bobbin which runs free on a wire that is made fast to the stake, which should be about a foot long: you should have a strong rod, to serve either as a clearing hook or landing net, made to screw in the end of the rod. When you lay your trimmer, drive the stake into some harbour to secure it from the eye of passengers who may interrupt: then bait the hook as before mentioned. Make use of your rod to guide the bait to the place where it must lie clear from weeds, that the bait may shew itself. Make use of them from September to January, when the pike are in deep waters in most of our rivers, such as the river Lea, Woodford, Severn, and many others in this kingdom, standing lakes, &c. &c. Remember the last thing to be done is, to bait the hook that the fish may be preserved alive as long as possible. In baiting trimmers there is no occasion to tie the tail with thread as in trolling, the bait not having any strain on that part, and is fairer to the eye of the jack. There should be a notch in the stake to hitch the line gently to, that it may not run too far with the stream.

The Gorge Hook

Is mostly used in summer trolling, when the weeds are strong on the shore where the pike lie, to strike as they are playing among the weeds. At that season of the year you must, in baiting your hook, enter the needle in the mouth of the bait, and draw the gimp out of the tail, tying it fast round the wire of your hook with a piece of thrum silk or worsted; here is no danger then of the weeds injuring your bait, which should be either bleak, dace, gudgeon, or small roach, bending it a little to make it glance in the water. The gorge hook is so common, it needs no further description. You should have a strong silk line, thirty or forty yards in length, wound on a bobbin or winch, made fast on your rod, which should be sixteen or eighteen feet in length, with a stiff top, and rings for your line to run through. The most likely shores to find pike are those near a deep water, where there is a strong harbour to retreat to at other seasons of the year, where you should not pass by without trolling; for in general the largest fish lie in the eddies and deep mucky waters, but they mostly run on the shore at that season under the tail of the long winter weeds. The best method of taking the hook out of a pike is, to unloop the line from the gimp on the hook, then by pulling it tight it draws the hook near the gill, and may be easily cut out of the pouch.

The Beard Hook,

By some anglers is preferred before any other in winter trolling, in deep water, when the weeds are rotten and not liable to injure the bait; for by its alluring motion in the water, by glancing about, it often causes the pike to strike at a greater distance at the bait than when the water is clear. In baiting your hook, be careful in serving the mouth of your bait fast to the beard of the hook, for sometimes the pike will strike at your bait when the line is not free to run and by that means you lose your bait. Use this from October to the latter end of February, or the beginning of March, when the pike are spawning and going out of season.

Live Bait.

BY some it is thought that the live bait is far superior to any dead bait; and there are many that use it, though attended with some trouble in summer trolling, to keep the bait alive. By frequently dipping your bait-kettle in the water when you are going any considerable distance from whence you first began; or, if you are trolling in any pond or lake, you may then sink your bait-kettle in the place near which you are trolling, and by these means you may keep your bait alive; and there is no doubt but you will meet with good sport. Your hook must be tied to a gimp a foot long, like that of the trimmer, hooked fast to the back fin of your bait.

Instructions for catching Pike.

THE audacity and voraciousness of this fish justly entitle him to the name which he has acquired of the fresh-water shark. You angle for him much in the same manner as for perch; but with a line twice as strong as that used for taking the biggest of that species of fish; with a large Kirby pike-hook, armed upon gimp, which is far preferable to wire for that purpose; and with a cork float of a size proportioned to the rest of your apparatus: the top-joint of your rod must be twice the size of that used in angling for carp. You may bait your hook either with a good sized roach, dace, gudgeon, rud (which is a bastard kind of roach) or a small carp or tench; but what I would chiefly recommend for this purpose is a crucian, about five or six inches in length or something longer, which, by repeated experience, I have found to be more agreeable to the palate of the pike than any other sort of bait whatsoever; the rud, I think, stands in the next degree of estimation. Both these fish, though not in great plenty, are to be found in ponds at some distance from London; and the rud, like the true roach, may be caught either with gentles or paste. In the months of March and August a large species of yellow or greenish frog is likewise used as a bait for the fish on which I am now treating. When you have plumbed to the distance of half the depth from the surface, drop your line in very gently; taking particular care that your bait be alive and in full vigour, as on this circumstance depends, in a great measure, the whole of your success. Whenever you perceive that you have a bite, suffer the fish to keep your float under water for the space of one minute, then strike with two smart jerks, in order to fix the hook securely in his mouth: if he chances to be of a large size, play him for some time, otherwise you may pull him out immediately. I must remind you once more of the necessity of your angling for this fish with a bait that is perfectly lively and swims strong, as with such I have frequently met with great success, when the common methods of using towing, trimmers and men of war, and of laying lines, have all failed. You may fish then ineffectually with a dead bait a very considerable length of water in the course of a day, but with one that is alive, if the pike, when you have thrown in your line, does not take it quickly, you should remove from thence to another part, this fish being noted for biting almost immediately, if at all. His usual hours of feeding are about two o'clock in the morning, and four in the afternoon; and his chief haunts near the banks of rivers, among the weeds, rushes and reeds, in wharfings, deep holes, eddies, scours, and shallows, under stumps of trees, and at the mouths of rills or ditches, where they discharge themselves into the river: he may be taken either in summer or winter, but the latter season is the fittest; and a strong boisterous wind will greatly favour your sport. Few of this fish are to be met with in the New River; so that these directions may be equally adapted to every kind of water.

Instructions for catching Trout.

THIS fish commonly bites with great freedom, if the tackle and baits you make use of are chosen with judgment. Trout may be taken either in the common method, or by whipping with flies, both natural and artificial; and for the purpose of taking trout by flies, you must follow the directions, which you will find mentioned for catching chub and dace. In the common mode of angling, your rod must be furnished with a stout top-joint; and your line should be made either of Indian twist, or sea-grass; observing to proportion the length of the line to the size of your rod. When you angle for this fish at the bottom, on the drabble, let your line be loaded by a bullet, with a hole drilled through it, in order that it may slip up and down, and two shot placed at the distance of three inches asunder; the upper one supporting the bullet; the size of which must be adapted to the degree of rapidity of the water in which you fish. In a gentle stream you may angle without a bullet; and use two or three shot, or as many as the strength of the current shall require. Bait your hook either with two or three large well-scoured marsh-worms (by some called brandlings) minnows, small frogs, three or four caddis (for a description of which see the following chapter) or half a dozen of ant-flies. When you find that you have a bite, you must conduct yourself according to the directions I have before given you on that subject, in the chapter on perch-fishing. The larger trout are to be taken with most success in a dark night, with a stout rod, and a line of sufficient strength, but not too coarse, baited with two large lob-worms; dapping therewith (which term you will find used by eel-fishers) on the surface of the water; but observe that this method is to be pursued in fishing for the over-grown trout alone. The proper season for these are the months of April and May.

Methods

Methods of angling for Gudgeons.

This fish, though small, is the best flavoured of the whole finny tribe next to the smelt, and will afford you no small amusement in taking him, if you pay due attention to the following rules. Gudgeons are found, in great plenty, in the New River, small rivers, River Lea, and generally in most running waters. Those in the River Lea are of a size superior to any others taken in the environs of London. They usually secrete themselves under weeds, in rough water, such as the parts about sluices, grates and eddies; and among the sedge growing at the sides of rivers; particularly during the spawning season, which commences at the end of April, and ends about the same time in May. They are best tasted when full of spawn, which term includes the latter part of March, and one half of the month of April. The rods you make use of for taking this fish, should be in general of a small size, and your line a very single horse-hair, either from the main or tail, or of goat's hair. Your hooks must be very small, to the number of three or four on a line, and placed at the distance of six inches from each other. A curious double plugged float, and small shot, fixed at about three inches from the hook, will best answer your purpose in the present instance. The depths at which you are to angle will vary, according to the season of the year, the nature of the water, and other circumstances; all which you will find minutely specified in this chapter; and this observation you must bear constantly in mind, in the choice of your baits, rods, lines, and all the rest of your apparatus. When you fish in the New River, or small rivers, in the early season, by which I mean the months of March and April, your rod must be small, your tackle proportionably fine, of a single horse or goat's hair, your bait a blood-worm, and you must plumb to the bottom, or very near it; and you may also throw in bread, as ground-bait: the common method of disturbing the bottom with a rake must now be disused, as being adapted to the warmer season alone. The rules for angling for gudgeons in May, differ in several material particulars from the foregoing. They are now to be sought for at half-water, which is the depth equally distant from the surface and from the bottom, and the bait which they prefer before all others, is the caddis or case-worm; of which I shall give you a particular description, accompanied with an interesting observation or two, when I have described the manner of angling with it. Having separated the head from the body, take the latter and thrust your hook into it, beginning at the upper part, and bringing the point out nearly at the end of the tail. Your line must be a fine single hair, with three or four hooks on it, all baited according to the above directions; and you cannot, in my opinion, fail of success. But I shall now discharge the promise which I recently made you, relative to the description of this small but curious worm. The caddis is one of those little reptiles which, at a certain period, quit their vermicular state, and assume that of a fly. The title of case-worm has been given to this, in our eyes despicable, creature, with reference to the mansion which the all-wise and beneficent Creator of the universe has allotted it, as a preservative from the numerous dangers to which, from his extreme imbecility, he must otherwise have been constantly exposed. This mansion or case, as it is termed, is composed of a substance resembling straw mixed with small pieces of wood, and covered with a glutinous matter, by means of which the entrance of the water is prevented, and the materials of the little fabric are firmly cemented together: a number of pebbles, also, are constantly found adhering to its sides, and, by their weight, serve to sink and to detain it at the bottom: the case, which at first is no larger than a blade of common hay-grass, continually encreases in bulk, in proportion to the [illegible] of its inhabitant. These worms are to be met with in great numbers, at the proper season, under the banks of most rivers. The ingenuity of the curious and learned has been frequently exercised on the subject before us: but all their researches have been, hitherto, attended with little success. In July and August bait either with a blood-worm, the tail of a common red-worm, or the same part of a green or yellowish grasshopper, with which the fields abound at this season; and which is now preferable to all other baits, both for roach and dace as well as gudgeons. You must fix it on your hook in the same manner as I have directed for caddis. During the above months vast quantities of the green silk-weed are found floating in the narrow river, which at once destroy your sport, and also give the fish so rank a flavour, that the few which you may accidentally take, by dipping or dapping, will scarcely be eatable. I shall now instruct you in the right method of grabbling, as it is termed in the Piscatorian dialect, for gudgeons. For this purpose you must be furnished with two middle-sized rods, with top joints as taper as possible. Your line must be of fine single-hair, and your hooks proportionably small. A large No 1, or No 2, shot, with a hole bored exactly through the middle, that it may be slipped up and down when necessary, must be placed on your line, and you must fix a small cleft shot four or five inches above the hook, to keep the large one mentioned above, at a proper distance from it. Plumb your depth to the bottom, and, having baited with the tail of a caddis, and the same part of the green grasshopper, on separate hooks, throw in your two lines, the one in the mid-stream, the other near the sides. Three or four hooks may be fixed on each line, but, in that case, the cleft shot which supports the lower one, must be placed at a greater distance from the bottom of the line. The most general bait for gudgeons, except in [illegible] the [illegible] may [illegible] ing waters in [illegible] appear till June, [illegible] season for [illegible] mostly commences in March [illegible] of November. They are usually found [illegible] in all such places as offer them [illegible] and in navigable rivers [illegible] time for angling for them [illegible] the night [illegible] chiefly accustomed to [illegible] will bite with a degree of [illegible] as far as [illegible] shyness will permit [illegible] time also; [illegible] reflux of [illegible] you may fish in the Thames with [illegible] probability of success. After violent storms of [illegible] and rain, when the water is become foul and muddy, [illegible] will [illegible] the bait [illegible] observe that you must ex- pect little sport in moonlight nights, as at those times [illegible] feed with great reluctance. Rods are used but seldom [illegible] catching these fish; and the lines with which you [illegible] nish yourself [illegible] from all those [illegible] have hitherto [illegible] must be made of [illegible] small cord, [illegible] according to the depth and force [illegible] either loaded [illegible] bullets or [illegible] you angle, chance [illegible] either [illegible] which you [illegible] with a [illegible] and [illegible] su[illegible] [illegible] yellow [illegible] of these [illegible] should be [illegible] your b[illegible] must [illegible] and if alive [illegible] for the [illegible]

Take a large needle, made of wire, with an eye made to it of a proper size. Pass the upper part of your foot link through the eye of the needle, and thrust the sharp end of it, together with the straight part of your hook, into the mouth of the bait, bringing them out at the tail; the head and point of your hook lying on one side of the creature's mouth. Having in this manner baited as many lines as you intend to use on the occasion, lay them in rings on the bank of the pond, and then throw each of them in nearly to the whole extent of its length, reserving a small part, which must lie loose upon the ground, that the fish, when he has taken your bait, may be at liberty to swim to some distance before he pouches it, as he will otherwise infallibly relinquish his hold. By the above method I once caught an eel in the New River, on a spot directly opposite to Sadler's Wells, which weighed seven pounds, and was of the true silver kind. A large lob worm, which has been previously kept in moss for five or six days, will sometimes tempt these fish to bite, when the live bait above described may [illegible] to fail. In the New River, you must angle with lines no more than three or four yards long, loaded with a small bullet, and baited in the manner above described; but in the River Lea, which is more rapid than the other, a greater weight of lead will be required [illegible]. In this last river you may also [illegible] barbel, chub or flounder, while angling for the eel which makes the subject of this chapter. In the hot months, the fittest baits are boiled shrimps, either shelled or otherwise, square pieces of raw, or boiled salt beef, particularly the latter, and with these you may fish in the Thames, either under the sterns of the ships, or as near as possible to the bridge. Here you must make use of a shooting line, made of strong small-cord, of a great length, with two dozen of the best eel-hooks fixed on with double hog's bristles, a noose to each bristle, and loaded with two or three pounds weight of lead. If you substitute periwinkles and gentles in the place of the shrimps and beef, and fish proportionably finer, you may catch some very large-sized roach and dace. Should you be at any time inclined to angle for these fish with rods and lines, you must observe the following rules: Your rods should be of a middling size, not too long, with a stiff top-joint to each, and three in number. Strong silk, or carp-lines, with three large perch-hooks to each, fixed on with double hog's bristles, will best answer your purpose. Each hook must be baited with the head of a very fresh bleak or gudgeon, the beard and point of your hook being forced quite through, otherwise you will constantly lose your bait; the hooks must be placed at a due distance from each other, to preserve the line from being entangled. With one of your rods you must angle in the mid-stream, and with the others near to the sides. Bait with pieces of the belly part either of roach, dace, or lampreys; bleak and gudgeons are also very eligible for this purpose, but in small rivers I have frequently found the head of a bleak excel every other kind of bait whatever. The proper time of angling in the manner here described, is by day in the months of June, July, and August.

How to sniggle for Eels

Furnish yourself with several lines, lest any of them should chance to be broken. They must be made of chalk-line, or middle-sized whip-cord not twisted too strongly, and of the length of two or three yards. Take a short but thick needle, thoroughly tempered, and break off the head part. Sharpen the remaining part to a point, but it must not be too fine. Whip your line to the needle half way, and no farther towards the middle. Take a well-scoured lob worm, and thrust the point of the needle through the creature, from head to tail; drawing the head a little way up your line, in order to cover the broken part of the needle, and leaving a small portion of his tail loose, the better to deceive the fish with an appearance of the whole body being equally free. Coil the upper end of your line several times round your left hand, that, when you have a bite, you may be able to give the fish some play, in order to induce him to pouch your bait. Thrust either a common switch, or the piece of whalebone which is at the end of the top-joint of your rod, into the head of your bait, and therewith guide it carefully to the blow or hole where you suppose the eel to lie concealed, holding your line rather loosely, lest you tear it through the body of the worm. When you perceive that you have a bite, of which you will judge by the worm being taken off the whalebone, allow the eel a sufficient time to pouch your bait, after which you may strike twice, with a quick motion, but not too hard, as you will otherwise endanger your line, and by this method you will fix the needle in a cross direction in his body. If he does not come from his hole immediately, keep your line tight, and he will soon find himself compelled to dislodge, and, the instant you observe him to relax of his obstinacy, drag him to land with all possible dispatch, and discharge the needle from his body.

Instructions for Whipping, with natural and artificial Baits.

This method of angling may be practised with success, for different kinds of fish, throughout every month in the year. The proper time of day for it is about eleven o'clock in winter, and in summer proportionably earlier, when the sun has acquired a sufficient degree of [illegible] and strength. The rod to be used for this purpose is distinguished by the title of a fly or whipping-rod; a description of which you will meet with under that title, in the beginning of this work. Your line must be made in the manner following,

Tak

Take four links of fine single horse-hairs, with water knots at the ends, three links of two hairs twisted together, three of three hairs, two of four, one of five, two of six, and three of eight hairs. These links must be whipped one to the other, in the same manner as you whip a hook, with fine silk waxed with shoe-maker's wax; the whole forming one complete and curious line. A young angler will, at first, find some difficulty in delivering a line of this length, and may therefore shorten it, by omitting whatever number of the links he shall think proper: the top of your line must be formed into a noose. Your hook must be either of a larger or less size, according to that of the fish for which you angle, and the same rule will serve to direct you, in the choice of your lines and rods also. The chief baits used for this kind of angling are the heads of caddis taken off as low as the black skin extends, (two or three on a hook for chub and dace, and a single one only for bleak); all the various species of flies, both natural and artificial, black and brown velvet, and pieces of men's dyed hats, but the best of all these are the caddis, which I have found in their hiding-places in January, two months prior to the earliest period at which they have ever been discovered by any of my brother anglers. My method of taking them is with a small landing-net, made of the caul of a wig, with a piece of strong wire bent round it, leaving a sufficient length of wire to serve as a handle, which I tie to my cane or walking-stick: I also put a portion of the weeds under which they are found, into the bag wherein I keep them. A northern and easterly wind are equally unfavourable, particularly in the colder months, for this kind of angling. Your line being fixed and properly baited, place yourself on the verge of the stream, with your back, if possible, to the wind. Wave the line over your head, in the same manner as a coachman does his whip; and, with a gentle motion of your wrist, cast it sometimes under the opposite bank, and sometimes into the middle of the stream. When you observe a circle or a fissure to appear on the surface, instantly strike, and, if the fish you have hooked chance to be of a large size, play him deep for some time before you draw him to shore. If you bait with the heads of the caddis, which are naturally tough, you must strike the instant that your line touches the water and with a greater degree of force. Remember to thrust your hook entirely through the heads, or otherwise you must expect little sport. The reason why the fish bite so eagerly at this bait is, that it bears a striking resemblance to a certain dark-coloured fly of which they are particularly fond. I once caught, so late in the year as the month of December, in the New River, three dozen and a half of bleak and dace, by whipping with a piece of black velvet only to the great astonishment of many gentlemen who were present at the time. The velvet of this colour is mistaken by the fish for the common black fly, and the brown velvet represents the cow-dung fly. In whipping with a fly, you must suffer the fish to pouch your strike. This method of angling is preferred, by those who are skilled in the art, before all the other kinds; and you may thus take a trout, or a salmon, with as much facility as you can a chub or a dace, provided your tackle for the former be proportionably stronger. You must also, in this case, be furnished with a winch, or reel, to prevent your line from being broken. But observe that you do not pretend to whip for the large kinds of fish, till you have attained to proficiency in taking those of a smaller size. If you would acquire a degree of perfection in this branch, you must accustom yourself to throw lines of every length, from two to twenty yards and upwards, but, for such as the last mentioned, your rod must be of the double handed kind. It is very difficult to throw a line against the wind, or even at those times when there is little or no wind stirring, both these methods are, however, attainable by application and practice, although it would be a vain attempt to communi cate to you the proper rules in words. I shall, therefore, only observe that, if the wind chances to blow strongly in your face, every endeavour to throw your line will be fruitless and that, in both the foregoing cases, your lines and rods must be proportionably stouter and coarser.

Proper Method of Dipping or Dapping.

When either the weather is too cold, or the wind too boisterous to admit of your angling with any prospect of success in the method described in the preceding chapter, you may try your fortune in dipping or dapping, as we term it, according to the subjoined instructions. Your rod must be formed of four or five joints, with a fine taper top; your line of a fine single hair from top to bottom; with a good sized roach or dace-hook, properly bearded and pointed. These directions regard the New River alone; but in all other places, where the fish are larger and the current more rapid, your rod and tackle must be proportionably stouter. If you should be inclined to angle near the side of the river, retire to such a distance from the water's edge as to be out of the view of the fish when they rise to the surface; and, your line being baited either with a natural fly or a grasshopper, according to the season, cast it in; observing constantly to place yourself with your back to the wind: in this manner you may angle either at top, bottom, or at half water, as you shall judge most conducive to your sport. When you have a bite, suffer the fish to pouch your bait before you strike, and then proceed as I have already directed you in that case. In this, as in all other cases of angling, he who fishes fine will always stand the best chance of success; and I remember to have taken a chub, and a trout, with a line made, the whole length, of a fine single hair, the latter of which weighed something more than four pounds, and the other four pounds and half: the chub I took in the New River, near

Bow,

Boaz-Farm, and the trout at Merton-Abbey, beyond Wandsworth. In angling with a fly in a deep stream, let your bait float on the surface, and be carried away by the current to whatever distance you think fit: this method may be pursued with success when the baits are too tender to be used for whipping.

Rules for Winter-fishing.

In the winter season, the fittest baits for the New River are blood-worms, white paste, and marsh-worms for the larger fish, and chewed bread for ground-bait. In other places use gentles and worms of all denominations, and brains of a bullock, bruised, not chewed, for each, throwing in a certain portion as ground-bait, of which another kind also may be used, made with bread and bran. The best winter-paste is of white bread, mixed with a small quantity of mild Cheshire cheese, grated fine, and coloured with turmeric or saffron reduced to a powder: with this paste you may mix another, which is tinged of a deep red with vermilion. This red paste is to be used separately when the water is very foul and muddy. The large fish are, at this season, to be sought for at the bottom, and those of the smaller size at half-water, particularly if the streams happen to be foul.

Of natural Flies, Moths, Grasshoppers, Gnats, &c.

These several denominations of insects are to be found in every month of the year, according to their different species, which are so numerous, that they cannot possibly be particularized in the bounds which I have prescribed to myself. I therefore have specified those only which appeared to me to be the most worthy of attention. You must keep them in a phial, burning a hole through the cork, for the purpose of giving them air, or in a dry box, when they are of a tender sort, and you must sprinkle a small quantity of dust on them, otherwise the moisture, which continually proceeds from their bodies, when pent up in this manner, will inevitably destroy them in the course of one hour. In baiting your hook with these minute creatures, you must force the beard and point quite through the body, beginning at the head and bringing them out at the rump: you must also be careful to allow the fish a longer time to pouch the bait than you are accustomed to do when angling with the caddis, and the other articles which I have recommended for this purpose. The different kinds which I shall notice here, are the following:

A dark coloured fly, with spreading wings, which first appears about April and continues to the beginning of June, and to which the head of the caddis bears a most exact resemblance. It is found commonly by the side of rivers.

The cow dung fly, of which there are four different kinds. The first is of a dark brown colour, inclinable to a red, of a coarse substance, and is much less esteemed by the fish than any of the others. The rest are distinguishable from this and from each other by their colour, and a finer texture of their bodies; the two next being of a pale brown, and the last a dark green. There is also a regular diminution of their size, so that the smallest species are formed by nature of so tender a substance, that they cannot be used for any other purpose than for dipping or dapping. Next to the caddis, these are the fittest bait for chub and dace.

A very small kind of black fly, which you will find in great numbers in the grass in the month of February: you must make use of two of these for a bait.

The stone cad-fly, found in April on the banks of rivers this, during its season, excels every other kind of bait, either for whipping or dipping.

The drake or true cad-fly, called by many the May-fly, from the month in which it is in season. This fly is long-shaped and spotted like a snake, with yellow and black spots; its wings are broad and shining, and cock upright, with three long whisks at his tail. You may angle at any depth of water both with this fly and the foregoing, either for roach, dace, trout, or chub.

The ant-fly, both of the black and red sort, is found in little hillocks of loose earth, which they throw up much in the manner of moles, and which are distinguishable by their colour; some being of a sandy and others of a black, according to the different species by which they are inhabited. These flies first make their appearance in June and continue to the end of August.

The grasshopper, which is in season during the months of June and July, may be made use of with great success; either the whole body or the tail part alone.

Two species of bugs, the one of a fine green, the other of a dark colour; both of which were first discovered by myself to be fit for the purpose of angling. The first of these is of a very tough substance, and you must force your hook quite through his body, beginning with that part where its junction with the head takes place. The green bug is found, in July and August, on the banks of the rivers, and the other sort among the cow-dung in August to the beginning of November. One of these bugs is a sufficient bait for a small fish, but two must be used for those of a larger size.

The father-long-legs, the blue-bottle fly, the large brown moth, which is found among the sedges next the banks of rivers, and the drone-bee, whose chief haunt is among the yellow flowers growing by the river's side, are all excellent baits for the larger kind of fish during the autumn; and for those of the smaller sort you may make use of the common and lesser-sized house-fly.

The blood-worm fly, or gnat, is found from May to the conclusion of the hot months, up on the posts and rails by the river's side and on the walls of houses. Of this insect there are two kinds, differing from each other in size only. They are long-shaped, and of a grey, inclining to a brown colour, with bright shining wings of a pale green. They are produced from the blood-worm, and continue for some time in a state which partakes in equal measure of both natures. The head of this creature is encircled with a soft substance, greatly resembling the down of a thistle, and its body is too tender to admit of its being kept in a phial, as I have directed for the more hardy species of insects. This is one of the best baits for the New River, throughout the whole of the summer season.

Proper Methods for making Artificial Flies.

The directions which I am about to give you on this subject would become doubly serviceable to you, if you could meet with any experienced in the art who would readily undertake to make a few flies in your presence; thereby you would acquire a more perfect idea of the matter, than can possibly be conveyed to you in words. But if you should not be thus fortunate, your own observation and contrivance must supply the want of such assistance; and I trust that you will find the following instructions calculated in the best manner possible to forward the effect in question. You should, at first, practise upon a large hook, till you have attained to some degree of proficiency in the art, when you may choose one that is of a smaller size. When you are about to make an artificial fly, lay one of the same species or a natural fly before you, and you will thereby be enabled to imitate it with greater degree of exactness. Having collected a sufficient quantity of hairs, hooks, feathers, down of various kinds, silk, and all the other requisites, choose a large roach or perch [illegible] with waxed silk, to the inside of the

trunk,

shank, a single hair, in which you have previously made a slip-knot, to prevent your hook from slipping off the line; at the same time drawing the knot quite close. Then repass the silk, by three or four wide turns, till you have brought it within a small distance of the shank, but be cautious neither to break nor cut off your silk till you have proceeded further in your work. The wings must be *made of a feldfare's or starling's lightest wing-feather,* and of a length proportioned to the size of your hook, to which they must be neatly whipped; laying one on each side of the hook, near its bent, and the small ends of the feathers cocking upright. These ends must be whipped a little between the wings, to make them spread in due proportion as to length and breadth, after which you must fasten your silk tight with one or two slip-knots, and cut off the superfluous parts of the wings. Then pass another piece of the same silk along the straight part of your hook and no further. You must now take as much down or fur as you shall want, of the colour of the fly which you would imitate, and spin or twist it round the silk fixed upon your hook, using less of it near the bent than at the other end, that your fly may appear properly taper; the body must also be considerably thicker in the middle than at either end. When you have fixed on all the down requisite for your purpose, fasten it with two or three slip-knots at the wing part, and cut off all the useless silk, and also any superfluous hairs that may remain; and thus your work is completed. It is totally needless to make any head to your flies, as the fish will bite at them as readily without as with that part.

Such artificial flies and other insects as I deem necessary to point out to you, are to be made according to the following directions.

The black fly or gnat is to be made either with the short hair pulled from the tip of the ear of a coal black spaniel, the black down [illegible] the skin of a hog, the wool of a black sheep's foot; the end of a black cat's tail; black mohair, or the down of a black mole.

The cow-dung fly must be imitated with the down of a sandy or reddish-coloured hog; the hair of a dog's ear of the same colour; of a cow's, cat's, rabbit's or squirrel's hair; camlet; mohair; the yellow wool of a blanket, or of crewel of the above colour.

You may represent the body of the red *ant-fly* with two or three *small* tail-feathers of a *pheasant*, of a reddish-brown colour, wrapt neatly round your hook; and the black fly of the above species is to be counterfeited with the darker part of the same feather, or rather with those of a female pheasant.

The camlet-fly, as I have named it, must be made with a piece of camlet of a bright yellow colour, combed to pieces with a fine comb, and ribbed with silver twist; wrapping it tightly round your hook. The wings must be of large size, and made of the lightest feathers of a wild mallard. Trout are particularly fond of this bait, and will leap at it to a great height out of the water.

The May, or the cad-fly, is to be imitated, the *body* with a deep straw-coloured silk, ribbed with a plover's top or herle; the *wings* of the lightest feathers of a wild mallard, dyed of a bright yellow at the dyer's, and the three whisks of its *tail* with as many of the feathers of a pheasant. This also is an excellent bait for trout.

You may represent the body of the brown moth with the same coloured feathers of a peacock's wing. The brown feathers of a cock partridge's tail will serve to represent the wings of this fly, which must be duly spread and cocked upright.

Before I conclude, it will be proper to observe to you, that, in angling with the artificial flies, you must strike the instant you perceive that you have a bite, otherwise the fish will discover the deception, and you will inevitably lose him.

Instructio

Instructions for Fly-fishing, and the Flies proper for every Month.

THE art of making a fly is so necessary to the fishing with success, that (as Sir John Hawkins observes) "he hardly deserves the name of an angler who cannot do it." Though in fact, very good flies may be got at the fishing-tackle shops, provided proper directions be given for choosing them.

As the foundation of fly-fishing, it may not be improper to give the list of flies for each month in the year, according to the directions of Charles Cotton, esq. first published in the year 1676, together with such variations as have been made by later proficients, and published by later writers on this subject. Mr. Cotton confesses that few persons beside himself begin fly-fishing in the month of January; yet even in this month he has been successful in taking grayling. There are but few days in the month fit for the sport; and only an hour or two in the day, during a warm sun.

JANUARY.

There are no alterations in Cotton's directions for this month, which we therefore give nearly in his own words:

1. A red-brown, with wings of the male of a mallard almost white: the dubbing of the tail of a black long-coated cur, such as they commonly make muffs of; for the hair on the tail of such a dog dyes and turns to a red-brown, but the hair of a smooth-coated dog of the same colour will not do, because it will not dye, but retains its natural colour.

2. The little bright dun-gnat. This must be fished with having only one hair next the hook. It is made of a mixt dubbing of martin's fur, and the white of a hare's scut, with a very white and small wing; and it is no matter how fine

time you fish for nothing in this month will rise but a grayling, and of them I never, in this season, saw any taken with a fly, of above a foot long. But of little ones, about the size of a smelt, you may take enough with the two flies abovementioned.

FEBRUARY.

1. The little red-brown. The dubbing of this must be somewhat blacker than that of last month, and wrapt on with black silk.

2. A plain hackle, or palmer-fly, to be made on black ostrich hair wrapped, or tied down to the dubbing with red silk, and the hackle of a red cock over the whole.

3. The lesser hackle, which is made with a black body, a silver twist over it, and a red feather.

4. The great hackle. The body of this must be black, and wrapped with a red feather of a capon untrimmed. We sometimes barb the hackle-feather all over, sometimes barb it only a little, and sometimes leave the whole length of the feather on the top, or the back of the fly, which makes it swim better, and by which large fish are killed.

5. Gold twist hackle. Ribbed with gold twist, the body black, and a red feather over the whole. These hackles are taken from nine to eleven in the morning, and from one to three in the afternoon. They do great execution, and suit all waters, and any month in the year.

6. The great dun. This is made with bear's hair of a dun colour, and those wings of the feather of a mallard near his tail. This is deemed the best fly for this month, and is productive of great sport to the angler.

7. The great blue-dun. The wings of the dark grey feather of a mallard; the dubbing of a bear's hair next to the roots, mixed with a small quantity of blue camlet.

8. The dark-brown. The wings of a grey drake's feather, and the dubbing of the brown hair from the flank of a brended cow.

In the use of the above hackles, the angler will recollect that some of them suit one water, and some another, and likewise pay a proper attention to the sky, for their size and colour is to be altered accordingly. In clear water a small hackle is best, and in deep coloured water, a larger.

MARCH.

The same flies to be used in this month as in the preceding, exclusive of which we have,

1. The little whirling-dun, which is made of the bottom of a squirrel's tail, and the wing of the grey feather of a drake.

2. The bright-brown, made either of the down of a spaniel, or that of a cow's flank; with a grey wing.

3. The whitish-dun. The wings of this are made of the grey feather of the mallard, and the body of the roots of camel's hair.

4. The thorn-tree fly, made of a perfect black, intermixed with eight or ten hairs of Isabella-coloured[*] mohair. The body very small, and the wings of a bright mallard's feather. This fly is famous for its execution.

5. The blue-dun. The dubbing for this fly consists of the fine blue hair combed from the neck of a grey hound. The wings should be very white, and from the tenth to the twenty-fourth of the month he is most certainly taken.

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[*] Sir John Hawkins, in his notes on Walton's and Cotton's Angling, has this remark on the Isabella-coloured mohair. "The "Archduke Albertus, who had married the Infanta Isabella, daughter of Philip the second, king of Spain, with whom he had the "Low Countries in dowry, in the year 1602, having determined "to lay siege to Ostend, then in the possession of the heretics, his "pious princess, who attended him in that expedition, made a "vow, that till it was taken, she would never change her clothes. "Contrary to expectation, as the story says, it was three years "before the place was reduced, in which time her highness's linen "had acquired the abovementioned hue."

[†] N. B. This colour is whitish yellow, or buff colour a little soiled.

6. The little black gnat: the dubbing either of the fur of a black water-dog, or the down of a young black water-coot: the wings made of the male of a mallard, as white as can be procured: the body very small, and the wings not to extend beyond it.

7. After the middle of this month use the bright brown, which continues in use till about the tenth of April. The dubbing for it is to be had out of a skinner's lime-pits, of the hair of an abortive calf, which will be turned to gold-colour by the strength of the lime. The feather of a brown hen is best for the wings.

APRIL.

The hackles and flies in March are the same as those in this month; but the browns must be lapped with red silk, and the duns with yellow. In this month are likewise taken,

1. The small bright brown, which is made of spaniel's fur, with a light grey wing. It is taken in clear water, on a bright day.

2. The dark brown, the dubbing of the same colour, mixed with violet-coloured camlet. The wing of a grey feather of a mallard.

3. From the sixth to the tenth of this month use the violet-fly, which is made of a dark violet stuff, with the wings of the dark feather of a mallard.

4. The whirling-dun. This is made of the down of a fox-cub, and ribbed about with yellow silk; the wings of the pale grey feather of a mallard. This fly is usually taken at noon, from the twelfth of the month to the end of it, and occasionally to the end of June.

5. The yellow-dun. Dub with a small quantity of pale yellow crewel, mixed with fox-cub down from the tail, and warp with yellow: the wing of a palish starling's feather. This fly is taken from eight to eleven in the morning,

ing, and from two to five in the afternoon. It is a good fly for April and May.

6. The horse-flesh-fly. The dubbing of this is a blue mohair, with a pink-coloured and red tammy mixed; the wing light-coloured, and the head dark-brown. This fly is taken through the month, and kills best from two hours before sun-set, till night.

MAY.

This month and the following are more favourable to the fly-angler than all others in the year; wherefore we shall be very particular in describing the flies proper to be used; and first speak of those kinds that are least in esteem.

1. The turkey-fly. The dubbing ravelled out of some blue stuff, and lapped about with yellow silk: the wings of the feather of a grey mallard.

2. The great-hackle, or palmer-fly; the body yellow, ribbed with gold twist; the wings of a mallard's feather, and the dubbing of the fur of a black spaniel.

3. The light-brown with a slender body; the dubbing twirled upon small red silk, and raised with the point of a needle, that the ribs or rows of silk may appear through the grey feather of a mallard forms the wings.

4. The little-dun. The dubbing of a bear's dun-hair, whirled upon yellow silk; the wings of the grey feather of the mallard.

5. The white-gnat. This is composed of a black head, and a pale wing.

6. The peacock-fly; the body of the whirl of a peacock's feather, with a red head, and the wings of the feather of a mallard.

7. The cow-lady, a small fly: the wings of a red feather, or stripes of a red hackle of a cock: the body of a peacock's feather.

8. The cow-dung fly: the dubbing a mixture of light-brown and yellow, and the wing the dark-grey feather of a mallard.

It is to be remarked, that all the hackles and flies taken in April will be taken this month; only the flies must be smaller, and the hackles brighter.

We will now proceed to those flies which are most in esteem this month, viz.

1. The dun-cut. Dub with bear's-cub fur, and a little yellow and green crewel; warp with yellow or green; a large dun wing, and two horns at the head, made of the hair of a squirrel. This fly almost certainly kills.

2. The artificial green-drake. This comes in about, or soon after, the twentieth of the month, and is taken at all hours till the end of June, in stony rivers. Observe the following directions to make it. On a large hook dub with camel's hair, bright bear's hair, the soft down that is combed from a hog's bristles, and yellow camlet well intermixed; the body long and ribbed about with green silk, or rather yellow silk waxed with green wax: the wisks of the tail of the long hair of sables, or fitchet; and the wings of the white-grey feather of a mallard dyed yellow.

3. The artificial stone-fly. Make it of bear's dun-hair, with a little brown and yellow camlet well mixed, but disposed in such a manner, that on the belly, and towards the tail underneath, the fly may be more yellow than on any other part. Place two or three hairs of a black cat's beard on the top of the hook, in the arming, so as to be turned up when you warp on your dubbing, and to stand almost upright. Rib your fly with yellow silk; make the wings long and large, of the dark-grey feather of a mallard.

4. The black-fly. The body black, the whirl of an ostrich feather, ribbed with silver twist, and the hackle of

a black cock over all: this fly will kill, but is not to be mentioned with the two preceding.

5. The little yellow May-fly. The shape of this is precisely the same as the green-drake, and of a remarkably bright yellow, which is made of a bright yellow camlet, and the wings of a white-grey feather dyed yellow.

6. The camlet-fly. This is shaped like a moth, and its wings are finely diapered or watered. The artificial fly is made with dark brown shining camlet, ribbed over with a very small light green silk; the wings of the double grey feather of a mallard. It is a killing fly for small fish, and likewise for graylings.

JUNE.

The green-drake and stone-fly are taken till about the twenty-fourth of this month: and flies proper to the month are,

1. The owl-fly, which is taken from the twelfth to the twenty-fourth of this month, late at night. Dub with the white of a weasel's tail, and let the wing be white grey.

2. The barm-fly. Dub with the fur of a yellow dun cat, and the grey wings of a wild mallard's feather.

3. The purple-hackle, made with a purple body, whipt about with a red capon's feather.

4. The gold-twist-hackle, with a purple body, whipt about with a red capon's feather.

5. Flesh-fly. For dubbing make use of a black spaniel's fur, and blue wool mixed; and let the wing be grey.

6. The little flesh-fly. Make the body of the whirl of a peacock's feather, and the wings of the grey feather of a drake.

7. The peacock-fly. The body and wing both made of the feather of the peacock.

8. The ant-fly. Dub with brown and red camlets mixed, and let the wing be light grey.

9. The brown-gnat. Make the body very slender, with brown and violet camlet, well mixed, and the wing a whitish grey.

10. The little black-gnat. The dubbing black mohair, and the wing a lightish grey.

11. The green-grasshopper. The dubbing of a mixture of green and yellow wool, ribbed over with green silk, and over the whole a red capon's feather.

12. The little dun-grasshopper. The body made of a dun camlet, and very slender, with a dun hackle at the top.

JULY.

During this month all the small flies that are taken in June, will be taken, and likewise the following:

1. The orange-fly. Dub with orange-coloured wool, and make the wings of the feather from a blackbird's wing.

2. The little white-dun. The body should be made of white mohair, and the wings of the blue feather of the heron.

3. The wasp-fly. Make this of dark-brown dubbing, or else the fur of a black cat's tail, ribbed about with yellow silk; and the wings of the grey feather of a mallard.

4. The black-hackle. The body must be made of the whirl of a peacock's feather, and a black hackle feather on the top. There is likewise another without wings, made of a peacock's whirl.

5. The black-blue-dun. The wings must be made of the feather of a blue pigeon's wing. The dubbing is the fur of a black rabbit mixed with a little yellow.

AUGUST.

In this month are taken the same flies as in July; likewise,

1. A second kind of ant-fly; the dubbing of the darkest brown hair of a cow, approaching to black, with a dark wing, and some red warped in for the tag of his tail. This fly is almost certain to kill.

2. The fern-fly; the dubbing of the fur of a hare's neck, which resembles fern in colour, with a darkish grey feather of a mallard's wing. This fly is also a good killer.

3. The white-hackle; the body composed of white mohair, and warped with a white hackle feather.

4. A Harry-long-legs. Made of lightish bear's hair, and a dunnish hackle, and a few hairs of light blue mohair, and a little fox-cub down, warp with light grey or pale blue silk, and make the head large. This fly is commonly taken in a cloudy, windy day. All the same browns and duns that are taken in the month of May, are likewise taken in this month.

SEPTEMBER.

1. The camel-brown; the dubbing pulled out of the lime of a wall, whipped about with red silk, and the wing made of a darkish grey mallard's feather.

2. A fly to which no name is given, but thus made, the black hair of a badger's skin, mixed with the yellow softest down of a sanded hog.

Exclusive of the two abovementioned, all the same flies are taken in September as in April.

OCTOBER.

The flies which serve for the month of March, are likewise proper for that of October.

NOVEMBER.

The flies proper for November are the same as those which are taken in February.

DECEMBER.

It is not a very frequent custom to angle with a fly either in this month or in January; but when the weather is very mild, it is sometimes done. In this case, a brown, that looks red in the hand, and yellowish betwixt your eye and the sun, will both raise and kill in a clear water, which is free from snow-broth.

It may be proper to remark, that among all the flies abovementioned, none are so proper to kill a number, even of the largest fish, as the Drake and Stone-fly.

An ingenious writer on this subject says, "The reader "may depend on this list of flies, and rest assured, that "with some or other of this list of flies, especially with "the palmers or hackles, the great-dun, dark-brown, "early and late bright-brown, the black-gnat, yellow-dun, "great whirling-dun, dun-cut, green and grey-drake, camlet-fly, "cow-dung-fly, little ant-fly, badger-fly, and fern-fly, "he shall catch trout, grayling, chub, and dace, in "any water in England or Wales; always remembering "that in a strange water, he first tries the plain, gold, "silver, and peacock hackle."

After the above list of Cotton's Flies, to which we have made some few necessary alterations, it may be proper to give the following Catalogue of Flies, as it is separated into three divisions, under the titles of Modern Catalogue of Flies.

Modern Catalogue of Flies.

Number I.

FEBRUARY.

1. PEACOCK'S HACKLE. Peacock's herl alone, or interchanged with ostrich herl, warping red silk, red cock's hackle over all: it may be varied by a black cock's hac-

kle and silver twist. Taken chiefly from nine to eleven in the morning, and from one to three in the afternoon. This and the several other hackles, described in the course of this work, being very tempting baits, should always be first tried when the angler comes to a strange river; and not changed till he has found out, and is certain, what particular fly is upon the water.

2. The red-fly; is made of a drake's feather, and the body of a red hackle, and the red part of squirrel's fur. He has four wings, which lie flat on his back.

MARCH.

1. Ash-coloured-dun. Dub with the roots of a fox's tail; warp with the pale yellow silk: wing of the pale part of a starling's feather. This fly, which is also called the violet-dun, and blue-dun, is to be found on almost every river: it varies much in its colour, according to the season of the year. In March and September it is called, and very properly, the violet-dun, for it has often that hue; and therefore it is usual to mix the blue violet crewel with the fox-cub down. In April it assumes a pale ash-colour, and in May a beautiful lemon-colour, both body and wings. In June and July it is blue-black, and from July it insensibly varies till it becomes of its primitive colour, violet dun, which it never fails to do by September.

2. Green-peacock-hackle. Greenish herl of a peacock: warping green silk, a black hackle over all. Taken from eight to eleven in the morning.

3. Dark-brown. Dub with the hair of a dark-brown spaniel or calf, that looks ruddy by being exposed to wind and weather: warp with ruddy or chocolate-coloured silk. The wing of the darkish part of a starling's quill-feather. Taken chiefly from nine to eleven in the morning. The same fly is taken in September.

APRIL.

APRIL.

1. Blue-dun. Dub with the fur of a water-rat, and warp with ash-colour: the wing of a coot's feather. Morning and afternoon.

2. Pearl-colour, or heron-dun. Dub with the yellowish or ash-coloured herl of a heron, warp with ash-coloured silk: wing from the short feather of a heron, or from a coot's wing, of an ash-colour.

3. Spider-fly, comes about the middle of April, if the spring be favourable. The wings are made of a woodcock's feather, that lies under the but end of the wing; the body of a lead-coloured silk, with a black cock's hackle wrapped twice or thrice round. The shape of the body the same as that of the ant-fly. In bright and warm days this fly appears, and comes out of beds of gravel by the water-side, where, in such weather as abovementioned, they may be found in clusters from the middle to the latter end of the month.

4. Cow dung-fly, comes on about the middle of March, and continues till the latter end of April, but it is not to be fished with unless it be a cold windy day. The wings should be made of the blue feather of a hen tipped with yellow, to lie flat: make the body of a lemon-coloured mohair, with a yellow feather about it. The whole should look like the large horse ant-fly.

MAY.

1. The oak-fly. Some call this the ash-fly, and the others the cannon-fly. The head of which is large, of an ash-colour, the upper part of the body greyish, with two or three hairs of bright-brown mixt, and a very little blue, and sometimes a hair or two of light green: the tail part is greyish mixt with orange: the wing of a mottled brown feather of a woodcock, partridge, or brown hen, the hook No. 8 or 9. This is the fly which is seen so frequently in

April, May, and June, on the body of the ash, oak, willow, or thorns, growing near the water, standing with its head downwards: it is an excellent fly; but difficult to imitate, being of many colours, unequally mixed. It takes chiefly in the morning; it does not seem to come from any caddis; for it never drops in great numbers on the water; and the wings are short, and lie flat on the back, like the blue-bottle, or large flesh-fly.

2. The orange-tawney, orange-brown, camlet-fly, alder-fly, withy-fly, or bastard-caddis. Dub with dark brown camel's hair, or calf's hair that shines, or barge-sail, warp with deep orange; black hackle under the wing. The wing of a darkish feather of a mallard or starling. Chiefly taken of a morning before the green-drake comes upon the water.

3. Silver-twist-hackle. Dub with the herl of an ostrich feather; warp with dark green, silver-twist, and black cock's hackle over all. Taken from nine till eleven, particularly on a showery day.

4. Light-flaming, or spring-brown. Dub with light brown of a calf; warp with orange colour; wing of a pale grey mallard's feather. This is a good fly, and taken chiefly before sun-set in a warm evening.

5. Sooty-dun. Dub with black spaniel's fur, or the herl of an ostrich, warp with green; wing, the dark part of a land-rail or coot. Taken best in a showery day, and likewise in the months of April and June.

6 The yellow-miller, or owl-fly. The body of a yellow marten's fur, or ostrich herl dyed buff-colour: wing of the ruddy feather of a young peacock's wing, or pale brown chicken. Taken from two till four in the morning, and from sun-set till ten at night.

7. Death-drake. The body, one herl of black ostrich, and two of peacock; silver-twist, black hackle: wing of the dark feather of a mallard, of a copper-colour. Taken chiefly in an evening, when the May-fly is almost gone

8. Huzzard: Dub with pale lemon-coloured mohair, or ostrich feather dyed yellow: warp with yellow, gold twist and yellow *hackle* over all. Wing of a very pale mallard's feather, dyed of a lemon-colour, the wings large, and longer than the body, lying flat on the back. Taken in a blustering day, before the May-fly comes in. This fly is little known, but the most beautiful of its species that frequent the water. It is larger than the green-drake, of a beautiful lemon-colour, both body and wings, which are four in number, and lie close to its back. It is to be met with but in few rivers, and is deemed a great curiosity, and in those rivers that produce them, they appear in great numbers about the latter end of April, at which time, and afterwards, the trouts rise at them very eagerly. Doubtless this is a true water-fly: it is supposed to be produced from very large caddis.

JUNE

1. Caddis fly, which proceeds from the cod-bait, begins with June, and is a large fly, having four wings of a pale yellow, and likewise a body of pale yellow, whipped with brown. The wings are made of a yellow hen's feather: the body of a buff coloured yellow fur, ribbed with dark brown silk, and a yellowish hackle three times round. These flies are not all gone till the end of the first week in July; and are to be fished with at the clearing of the water, after it has been discoloured, when no other fly will do so well. While in the state of a grub, it is an admirable bait for fishing at the bottom.

2. Sky-coloured blue-fly, begins and ends with the month of June. It appears only in the evening of a very hot day. It is made of the feather of a light blue hen, with a yellowish gloss: the body is made of a light blue fur, ribbed with a bright yellow, with a silver grizzled hackle over it. It may be used till the middle of July.

3. Orle-fly, comes down at the beginning, and continues till the end of June, and is the best fly to fish with after the May-flies are gone. The wings of this fly are made of a dark grizzled cock's hackle, the body of a peacock's herl, with very dark red silk. It has four wings, which should lie flat on the back as it swims down the water. This fly is to be fished with in the warmest weather; and may be successfully used from ten in the morning till four in the afternoon, at which time the fish decline the orle-fly, and bite at the sky-coloured blue abovementioned.

JULY.

1. Pismire. The body, some few reeves of a cock pheasant's tail feather, or ruddy barge-sail, or brown carpet, or old bear's hair towards the root, tanned with the weather: one peacock's herl may be twisted with it: warp with ruddy silk: wing the light part of a starling's feather left longer than the body. This is a killing fly after an emmet-flight, but not before.

2. Willow-cricket, or small peacock fly. A herl of green peacock's feather; warp with green silk: wing, of a starling's feather longer than the body. A morning fly, especially for grayling, in rapid rivers.

3. Middling-brown. Made of calf's hair, twisted upon pale yellow silk, for the silk to appear: wing of a mallard's feather.

4. Dark-brown. Warp with red silk, with a deep orange tag at the tail: wing, of a mallard's feather.

AUGUST.

Through this month the pismire is used; as likewise all the other flies of the month of July.

SEPTEMBER.

Large fetid light-brown. The body of light calf or cow's hair, or seal's fur dyed of fine colour: warp with ruddy or orange-coloured silk: wing, of a ruddy brown chicken, large and long. This fly is much upon Hackney river, and is much ruddier there than elsewhere. A killing fly in the morning.

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Number II.

JANUARY.

1. DARK-BLUE-HERL. The body, black rabbit's scut; black of a hare's scut; greenish peacock's herl: warp with brown silk: wing, the light part of a fieldfare's feather.

2. Black-hackle. Body, pale yellow silk, with a black cock's hackle turned about it.

3. Dun-hackle. Body, dun-coloured silk, with a dun cock's hackle.

4. Spring-black. Black wool of a sheep's face, with or without a greenish peacock's herl: warp with brown silk: wing, the grey feather of a mallard.

5. Second spring-black. Body, the very blackest part of the darkest hare's scut you can procure, with or without a greenish peacock's herl: warp with ash-coloured silk; wing, of a fieldfare's feather. This and the other spring-black, are taken best in bright weather.

FEBRUARY.

The flies directed to be used in January, are likewise proper for use in this month.

MARCH.

In this month the same flies are used as in January and February, and likewise the following:

1. The Turkey, or March-fly. Body, brown foal's hair; tops of the wings of a woodcock, some ruddy, others grey, well mixed together; warp with pink and yellow, or pink

and light-coloured brown silk, twisted together: wing, of the feather of a cock pheasant. This is thought to be the cob-fly, so much celebrated in Wales.

2. The brown-fly, or dun-drake. This fly begins to come down about the middle of March, and continues till the middle of April. It is made of the feather of a partridge or pheasant, the body of a partridge's hackle, with the fur of a hare under it, ribbed with yellow silk. This fly is taken from eleven till two or three o'clock.

APRIL.

1. Dun. Body, dunnish filmert, or marten's fur; Indian fox-dun; light dun fox-cub; coarse hair of the stump of a squirrel's tail, of a brightish brown, or a yellowish cad; warp with yellow silk; wing, of a light fieldfare's feather.

2. Pale, or sky-blue watchet. It is a small fly, and appears on the water on a cold day. The body, fur of a water-rat, black part of a hare's scut, the pale roots cut off; a very little brown bear's hair, warp with pale brown, or orange-coloured silk: wing of a hen blackbird.

3. Light Blue. Body, light fox-cub fur; a little light foal's hair; a little squirrel's fur that is light coloured; all these well mixed together; warp with yellow silk: wing, of a light fieldfare's feather.

4. Plain-hackle. Body, black ostrich herl, with red or black cock's hackle over it; and in hot weather add gold twist.

5. Red-hackle. Body, red silk and gold twist, and a red cock's hackle till June. Afterwards use orange-silk for the body. This is deemed an excellent fly; but it is to be observed that it is more properly the orange-fly: the colour is like that of a Seville orange. Wings may be added, either of a hen or chicken, of an orange or ruddy cast; or a dull dark wing, of the softest feather of a rook's wing. It has four wings, two next the body, of a very dark grey co-

lour, and two serving as a case over them, sometimes of a dirty blackish colour, and sometimes of an orange colour.

6. Yellow-watchet. Body, water-rat's fur, the blackest part of a hare's scut; greenish yellow crewel for feet; warp with green silk: wing, the lightest part of a blackbird's feather.

7. Black-caterpillar-fly. This comes about the middle of April, and appears till the middle of May. Wings, of a jay's feather, one part blue and the other part black: body, of a feather out of the top of a plover, with a dark hackle over it. The body of this fly is of a fine shag-like velvet, which the plover's feather makes admirably well To be fished with in warmer days, when it is also windy and cloudy; for then the flies grow weak for want of the sun, and fall, in great numbers, on the water.

8. Sand-fly. Body, dark brown foal's hair, a little blue squirrel's fur, and the whitish yellow of the same; warp with yellow silk. wing, the light part of a fieldfare's feather.

9. Green-tail. Body, dark part of a hare's scut, and darkest blue fur of an old fox: light part of a squirrel's tail, and a hair or two of the coarse brownish part of it for feet warp with ash-coloured silk: wing of a hen pheasant.

10. Knotted-grey-gnat. Body, darkest part of a hare's scut, dark brown foal's hair, dark fur of the black of an old fox; warp with grey silk: wing the blue feather of a fieldfare

MAY.

The above flies may be used in this month; and likewise the following.

1. Little iron-blue-fly. This begins and ends with May, and they come in great numbers in cold or stormy days. The wing of this fly is made of a cormorant's feather that lies under the wing, in the same form as those of a goose.

the body is made with the fur of a mole, or rather a water-rat's fur, ribbed with yellow silk, and a grizzle hackle wrapped twice or thrice round. The wings should stand upright, with a little forked tail. This fly is eagerly taken by the grayling.

2. Yellow-sally-fly, appears from the middle of May to the beginning of June. The wings are made of a yellow cock's hackle: it has four wings which lie flat, the body is made with yellow dubbing, mixed with dark brown fur, and a yellow hackle round it.

3. The shorn-fly comes in the middle of May, and continues about a month, and is frequently found in the mowing of grass: it has a husky wing of a dark brown colour, with fine clear blue wings underneath. It is a very killing fly till the May-fly comes in, though hitherto but little noticed by anglers. The wings of this fly are made of a jay's feather taken out of the wing, mixed with a little black and blue; and the body is made of a flesh-coloured silk with a red hackle over it. When the water is in order, this fly is a certain killer.

4. Blue-herl. Body, fox's fur, dark part of a hare's scut; greenish herl of a peacock, (if the weather is warm for the season, otherwise little or none of the greenish herl,) warp with brown silk: wing, of a starling's feather.

5. Dun. Body, dunnish blue fur of an old fox, mixed with pale yellow, the ends of the hairs of an old fox almost red; some coarse hairs taken out of the tail, or brush, warp with yellow: wing, starling's feather.

6. Black-herl. Body, black herl of an ostrich, and ruddy herl of a peacock, twisted together; warp with brown silk: wing, the light feather of a fieldfare.

7. Peacock-hackle. Body, peacock's ruddy herl; red cock's hackle; warp with red silk.

8. Pewit, or lapwing's-topping. Body, peacock's herl, and that of a lapwing's crown feather, twisted together; warp with red silk: wing, the red feather of a partridge's tail.

[illegible] orange-coloured wool, with [illegible] mixed; warp with orange silk: wing, [illegible] feather.

10. Light-blue. Body, light fur of an old fox, mixed with yellow pale [illegible]: warp with pale yellow silk: wing, light feather of a jay.

11. Red herl. Body, [illegible] herls of a peacock, twisted together: warp with ruddy silk: wing, [illegible] feather of a partridge's tail.

12. Stone-gnat. Body, the roots of the darkest part of a hare's scut, the top or ends being cut off: warp with ash-coloured silk: wing, a blackbird's feather.

JUNE.

Through this month the fish will take the following flies of the last month, viz. the black herl, red herl, dun, stone-gnat, light-blue, orange-brown, peacock-hackle, and pewit's topping. They will likewise take the following:

1. The Whitterish. Body, the root-end of the white part of a hare's scut; light-grey foal's hair, or camel's hair, towards the tail, the dark part of a hare's scut with some brown hairs mixed: peacock's herl for the head, warp with white silk: wing, the feather of a sea-mew.

2. Light-grey. Body, fur of the inner part of a rabbit's leg, the lightest of the dark part of a hare's scut: warp with ash-coloured silk: wings, light grey mallard's feather.

3. Brown night-fly, is made of the brown feather of a hen, and the body of the same colour. This is properly a moth, which flies by night, [illegible] to be used in a dark gloomy night after a warm [illegible]. [illegible] this fishing use a line about a yard longer than the rod, and put a couple of maggots at the point of the hook, which will be of great advantage to the smelling [illegible]. [illegible] take fish both in streams and standing waters, and you may here rise in as

much perfection as if you were fishing by day. They will continue to bite till day-break, if the night be gloomy and cloudy; but if it be a moon-shining or star-light night, they will not stir at these flies, any more than they will at the day-flies in a bright day.

4. White night-fly. This fly is, in my opinion, preferable to the former. It is made of the white owl's feather, on account of the softness of it, upon a middle-sized worm-hook; the body of the same colour as the wings, and as big as a very large wheat-straw. It is in perfection about the latter end of May, and continues to the latter end of June, and if the natural fly be on the water during the night, the fish will not fail to bite at your artificial one.

JULY.

The following flies, which are used in May and June, are likewise proper for use this month, viz. The peacock-hackle, black-heel, pewit's-topping, and red-heel. The whitterish and light-grey of last month may likewise be used, to which add,

1. The brown, which is thus made: body, hair of a very light brown or reddish calf or spaniel, and light bear's hair mixed; warp with pale orange: wing, the feather of a land-rail.

2. Red Spinner; begins with July, and ends about the middle of the month, and is useful only in the evenings of sultry days. The body is made of gold-twist, with a red hackle over it: wing, of a grey drake's feather, lightly tinged with a yellow gloss.

3. Large black ant-fly. Body, of an ostrich's black feather, and a black cock's hackle wrapped twice round under the wing. Wing, of the lightest sky-coloured blue feather that can be procured, and of the greatest gloss: this fly is made in the same form as the following.

4. Large red ant-fly. This, as well as the preceding, comes in about the middle of June, if the weather be hot,

and both continue for a week or nine days. Take notice that these two ant-flies that come first, are the large horse-ants. The wings of this red-fly are made of a feather out of the wing of a starling, of a dusky colour: the body of a hog's down, dyed of an amber colour. It must be made very large at the tail, and small towards the wing; with a red cock's hackle wrapped twice round under the but-end of the wing.

5. Blue-gnat; begins with July, and is a good killer, when the water is low and fine. The wings to be made of a light blue cock's hackle; the body, the blue fur of a fox, mixed with some yellow.

6. Welshman's-button, or hazle-fly. It takes its name from its shape, which is as round as a button. It comes in towards the end of the month, and has an outer husky wing, and a small blue one under it. These flies are found on hazle-trees and fern-bushes, and drop as soon as the bushes are touched. The body is made of the dark part of camel's hair, and the wing of the dark hackle feather of a pheasant.

AUGUST.

The peacock-hackle, black-herl, pewit's-topping, and red-herl, which are used in May, are likewise proper for this month; in which also are taken,

1. The brown ant-fly. Body, bright brown-bear's hair, much weather-beaten, almost of an orange-colour towards the tail; and therefore a few hairs of a light-brown or flame-coloured calf, or spaniel's hair, to be added in the tail-part. Warp with orange-coloured silk: wing, the light feather of a fieldfare or starling.

2. Black ant-fly. Body, darkest part of a hair's scut, and dark brown wool, or sheep's russet, equally mixed, and one single ruddy herl of a peacock, all twisted together; warp with copper-coloured silk; wing, a fieldfare's feather.

3. Grey-fly. Body, light-grey foal's hair, mixed with the dark part of a hare's scut; warp with grey silk: wing, of a hen-pheasant's feather.

4. Little red and black ant-flies. These come down the beginning of August, and are seen on the water from one to four in the afternoon. They are made of the same materials and of the same shape as the large ones are; but are only about half the size.

5. Little whirling-blue. This comes down the beginning of the month, and continues about a fortnight. The wings are made of the blue feather of a sea-gull; and the body, of the red part of a squirrel's fur, ribbed with yellow, and a red hackle over it. This fly is to be used in the evenings of very warm days.

6. Little pale-blue. This comes down the beginning of August, and continues till the middle of September. It is greatly admired by the grayling, which is now in season, and affords great diversion to the angler. The wings of this fly are made of the blue feather of a sea-swallow; the body of the bluest part of a fox's fur, with a very little yellow mohair mixed with it, ribbed with a straw-coloured silk, and a fine plain blue hackle over it. This fly continues till the willow-fly comes, and afterwards till the weather grows cold.

7. Willow-fly. This comes about the middle of the month, and continues till the dun-blue comes again. It has four wings, which lie flat on the back; the belly is of a dirty yellow, and the back of a dark brown. The wings are made of a dun cock's hackle a little freckled, the body of a squirrel's fur, ribbed with yellow silk, and covered lightly with the same coloured hackle as the wings. This fly is chiefly to be used in cold and stormy days, but in warm gloomy weather you must fish with the pale-blue, and these two flies last till the season for fly-fishing is at an end.

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FEBRUARY.

1. PRIME-DUN. Wings, of the feather got from the quill of a starling's wing; dubbing, of the down of a fox-cub, warped with ash-coloured silk. This fly is made very small, but there is another made of the same dubbing, considerably larger.

MARCH.

In this month the flies proper to February are likewise taken, as well as the following:

1. Palm-fly. Dubbing, of the hair of a brown spaniel, from the outside of the ear and a little sea-green wool mixed, warped with brown-coloured silk, wings, of the quill-feather of a starling.

2. Green-tail. Dubbing, of the brown hair of a spaniel, got on the outside of the ear, but, a little in the end of the tail, must be all of sea-green wool without mixture., wings, as the preceding fly.

3 Moorish-brown. Dubbing of the wool of a black sheep, warped with red silk: wings, of the feather got from a partridge's wing,

APRIL.

1. Bright-bear. Dubbing, of bright bear's hair, warped with sad cloth-coloured silk: wings, of the quill-feather of a starling. Some persons dub the body with yellow silk, which is the preferable method.

2. Yellow-dun. Dubbing, of yellow wool, and ash-coloured fox-cub down mixed together, dubbed with yellow silk: wings, of the feather of a starling's quill. Others dub it with dun bear's hair, and the yellow fur got from a

marten's skin, mixed together, and with yellow silk: wings, of a starling's quill-feather.

You may likewise make two other flies, their bodies dubbed as the last; but in the one mingle sanded hog's down, and in the other, black hog's down: wings, of a starling's quill-feather: and there is also taken an excellent fly, made of dun bear's hair, yellow marten's fur, sanded hog's down, and black hog's down, all mixed in equal proportions, warped with yellow silk: wings, of the feather of a starling's quill. The abovementioned flies for April are very good, and will be taken all the spring and summer.

MAY.

1. Fern-bud. This fly is fed on fern, and the natural one is very good to dib with: it has a short thick body, of a very dull greenish colour, and two pair of wings, of which the uppermost are hard, and sometimes taken off, but the undermost diaphanous. It is dubbed with the herl of a peacock, and very sad green silk: wings of the feather of a fieldfare's quill, got out of the wing.

2. Knop fly. Dubbing, of the down of an otter-cub, and the herl of a peacock; warped with black silk: wings, of the light-grey feather of a mallard.

3. Yellow May fly. Dubbing, of yellow wool, mixed with yellow fur of a marten; warped with yellow silk: wings, of the lightest coloured feather of a throstle.

4. Little-dun. Dubbing of an otter's fur; warped with ash-coloured silk: wings, of the quill-feather of a starling.

5. Thorn-fly. Dubbing of black lamb's wool; warped with black silk: wings, of the light-grey feather of a mallard.

It is to be remarked, that wherever the feathers of mallards are directed to be used for wings, those of the wild, and not of the tame mallard, are intended.

JUNE.

JUNE.

1. Mackerel. Dubbing, of light brown camel's hair, warped with black silk. wings, of the feather of a red cock

2. Sand-fly. Dubbing, of the wool gotten off the flank of a black sheep, warped with black silk wings, of the sad-coloured ſeather of a throstle-quill. Some persons make the body of the feather of a heron's neck

3. Purple-fly Dubbing, of purple wool, and a little bear's hair mixed, sometimes no bear's hair at all wings, of the quill-feather of a starling, warped with purple silk.

4. Black-midge, or gnat. Dubbing, of the down of a mole, warped with black silk wings, of a light-grey feather of a starling.

5. Grey-midge, or gnat Dubbing, of the down of a sad grey cat, or sad grey camel's hair, warped with sad ash-coloured silk wings, of the grey feather of a mallard

JULY.

Blue dun Dubbing, of the down of a water-mouse, and the bluish dun of an old fox mixed together, warped with sad ash-coloured silk wings, of the quill-feather of a starling.

AUGUST.

1. Th[illegible]e-fly. Dubbing, of a bright brown bear's hair, warped with red silk wings, of the saddest-coloured quill-feather of a starling. This is deemed a good fly.

2 Buzz-brown. Dubbing, of the light-brown hair of a cur; the head black: wings, of the feather of a red hen, warped with orange-coloured silk

3. Heath-fly. Dubbing, of the wool of an old black sheep, with some grey hairs in it for the body and head wings, of a light starling's quill-feather, warped with black silk.

SEPTEMBER.

Little blue-dun. Dubbing, of the down of a mouse, for body and head; warped with sad ash-coloured silk: wings, of the quill-feather of a sad-coloured starling.

Receipt for Broth of Perch, Roach, Dace, Gudgeons, Bleak, or Minnows.

THIS broth is extremely nourishing, and far preferable to any other kind made either from meat or eels. You must proportion the number of fish you make use of for this purpose, to their size and the quantity of broth you design to prepare from them: I commonly use two or three dozen of the perch, and eight or ten dozen of the lesser fish. Having cut off the heads of your fish, gutted, and carefully cleansed them from the gall, put them into an earthen pipkin or a tin saucepan (copper, how well tinned soever, will give the broth a bad flavour) and cover them with water to the height of half an inch, if your broth is required to be very strong, otherwise to the height of an inch. Add of onions, parsley and celery, of all or either, such quantities as shall be suitable to your palate, and season the whole with pepper and salt. Simmer your fish over a gentle fire, till they fall to pieces, and when you think that the broth is nearly ready, stir in a large lump of good fresh butter, well floured; and when the butter is wholly dissolved you may send your broth to table, having first strained it from the bones: it may be eaten with bread, either toasted or plain, according to your fancy. If you would choose to eat the fish with the broth, you must lessen the quantity of water, and boil them no longer when once they begin to crack: the proper sauce for them is melted butter and parsley.

PART XI.

CURSORY OBSERVATIONS

ON

PAINTING AND PAINTERS, SCULPTURE, ENGRAVING AND ETCHING.

ALTHOUGH in a former part of this work we have treated more particularly of the several methods of painting, yet it may not be improper to collect a few cursory observations, to assist the young student in the knowledge he should possess of the superior masters, and their performances.

In a work of this kind the most that can be effected is, to lead him into the inquiry, and give him an inclination to pursue it experimentally*.

Oil paintings are done with colours ground in oil, first brought to light in 1410, by John Van Eyck, in Flanders.

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* One of the best books on this subject is "Pilkington's Dictionary of Painters, &c."—To which may be added "Richardson on Painting." Ed.

Paintings in fresco, on a fresh plastered wall, are exposed to the open air: they are done either with size or oil, mixt with no other but earth colours. The manner of performing it is this: first, the painter draws and colours his design on a paper, joined together with paste, of the size the picture is to be; then cuts it into as many pieces as he judges one of them may be done in at a time. Then causing the plasterer to lay on that part of the wall, which must be thoroughly dry, the bigness of any one of these pieces, very smooth and even, with fine mortar, the painter traces, draws, and colours his design according to his model. The colours will, in the beginning, look faded, but rise to their original beauty, by degrees, when dry.

It was, in former ages, the practice to paint much on wooden pannels; they also used to glue linen cloth on boards, and laying over that a fine plaster of Paris, they painted the picture with water-colours, and glazed it over with a varnish.

Some paintings are done on marble, stone, porphyry, jasper, gold, silver, copper, &c. and some painters make use frequently of the spots in the marble or other stones, and preserve them so as to make part of the shades in the picture.

Glass-painting was originally performed with size-colours, but this being of no duration in the open air, it was at length brought to the perfection we now see, by fire, so as to be proof against the inclemency of the weather, and time itself. Of this see more in Vol. I.

Painting on parchment, ivory, or paper, is done with water-colours; that is, with such colours as are tempered with gum arabic and white sugar-candy, and is called the art of painting in miniature.

The division of the art of painting is according to the contents of the picture, viz. into *History*, wherein the persons or figures represented ought to be bold and highly finished; and into *Landscape*, more slight, and with fainter colours.

A landscape well painted will represent a natural and agreeable prospect, so that one may judge of the seasons of the year, the time of day, the weather, and the place itself after which it was painted.

Still-life, is a representation of inanimate beings, as flowers, fruit, dead game, likewise all manner of food, books, musical and other instruments, &c.

Portraits, are paintings after the life, wherein persons of both sexes are imitated as to age, complexion, and apparel, so as to be known at first sight. The common sizes for portraits are distinguished by, 1. The three quarter. 2. The kit-cat. And, 3. The whole length. The first shews only the head and part of the body down to the waist. The second, from the head to the knees. And, the third, the whole body, from head to foot.

Battle-pieces, are such as represent an engagement of two parties in the field of battle, by which several painters have shewn their art to admiration by the strength of their imagination.

Some have excelled in hunting-pieces, and represent a chase in a very lively and active manner.

Others have gained their fame and reputation by painting of animals, as horses, cows, sheep, &c. as near to the life as possible.

Some have made choice to shew their talent in painting birds and poultry.

Others, again, in grotesque. Their talent lies in painting twisted foliage, branches and leaves, by mere imagination, without being confined to nature: they exhibit in their pieces a mixture of various kinds of beasts, birds, flowers, fruit, urns, lamps, and things of antiquity; likewise syrens, sphynxes, masques, musical instruments, or whatever may have an affinity with the subject the painting is intended for.

In all paintings which present themselves to our view, we ought first well and carefully to examine the capital figures; whether the proportion of them be just, especially in women and children; whether the fore-shortening of them be true and agreeable to nature; whether the more distant grounds, on which the figures stand, have their proper size and perspective.

We must inspect into the light and shadow of a picture. Most painters, in their original pieces, take the light from the left to the right hand; but, in paintings on walls in apartments, the artist contrives the light to fall from the windows.

In examining the principal parts of a painting from nature, we must first consult, whether the invention and argument flow from general knowledge; whether the painter was familiarly acquainted with antiquity, history, poetry, geometry, optics and perspective; whether the things represented in the picture are according to nature; or the habits of the figures are adapted to the fashion of the time.

We must examine symmetry and proportion, whether the hand is answerable to the size of the body, and whether all the other limbs are in harmony one with the other; for beauty is real, where the joints, and every part of the body, have a due proportion one with the other.

In the next place, we must take notice and examine the colouring in a picture. There are two sorts of colouring; the one is called *claro-obscuro*, or grey in grey, though the colour be either blue, red, green or yellow, but shadowed from the lightest to the deepest shade. The other is done with a variety of colours, after nature, to which every thing represented in the picture must be agreeable; they must almost, in a manner, deceive the eye: we must observe whether the colours are so disposed as to help each other in their lustre; as red and green, yellow and blue, and so forth. In capital pieces we must imprint in our memory the manner of different masters, so as to distinguish the one from the other, by their designing and colouring.

Having made those observations, as above, we must further, in a history-piece, examine whether the representation of it is according to authentic relation, whether the drapery of the figures be according to the time they were painted in, and the fashion of the country, whether the animals, trees, plants, birds, &c. be the natural product. We must mind whether the characters are judiciously distinguished, so that a clown may not be introduced in the character of a prince, nor a prince in the character of a clown. An East-Friesland painter, who had a mind to shew his skill in painting the history of Anthony and Cleopatra, made choice of the Shout, or chief magistrate of the town, to represent Anthony, in a Friesland dress, sitting at a table, with a crown on his head, and a vast variety of dainties before him; next to him he placed the Shout's wife, in the character of Cleopatra, likewise in a Friesland dress, with a coronet on her head, and with one large pearl ear-ring in one of her ears, holding the other between her fingers, over a cup. He also introduced himself, his wife and children, waiting on them at table. This was told me for a true story, by one who had seen the picture, and that it was esteemed, by the possessor of it, of great value: he said the picture was highly finished; but whether it was for that, or the oddness of the design, so highly valuable, he could not be positive. We must likewise inspect into the passions of the persons represented, and gather from their faces the emotions of their heart; as for example, grief, anger, despair, &c. The famous Le Brun has excelled in this, especially in his painting of Alexander's tent.

England can boast a genius* of this kind, superior in talents to any other in Europe, and whose curious prints, as well as original paintings, will be the wonder, and admiration of future ages.

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* Mr. Hogarth.

In landscapes we must examine, whether the sky and the colouring of the landscape, likewise the time of the day, and the shadowing, correspond, and are agreeable to each other. For if a morning or evening-piece should cast a short shadow, it would be a fault; nor would it be praiseworthy, to exhibit bright and glaring colours, when the sun is shining sultry, at noon-day.

Too many houses and figures in a landscape ought to be avoided, and by no means to be admitted upon the foreground, except the painter introduces, in his design, some traces of antiquity. The tracts of ground must be so ordered, that they may be viewed beyond one another, agreeable to nature; so that a river may not seem to run up hill, or to flow towards a place that may hinder its course. The figures ought not to be painted brighter, but with sadder colours than the landscape.

Portraits must be painted in such a manner that the face and hands may seize the admiration; next to which is the drapery, which, however so well finished, ought not to draw off the attention from the face and hands: whatever else is added to a portrait, as trees, houses, apartments, or the like, must be done very slight and obscurely.

To paint Grey in Grey.

This has already been taken notice of: but there is another method of doing it, in the following manner:—The wall is blacked all over with burned straw, or charcoal, beaten to powder in a mortar, and mixed with size: when dry, it is strongly white-washed: this being likewise dried, the artist, with proper tools, scratches his design into the white, that the black may appear; and he shadows it with bold strokes, in the nature of graving or etching.

A
LIST OF THE MOST CELEBRATED PAINTERS.

All who intend to qualify themselves for connoisseurs in paintings will do well, first, to be acquainted and familiar with the styles of the most famous masters, and their performances: and, whenever he has an opportunity of seeing a fine collection of pictures, let him not neglect to make enquiry by what master the one painting, or the other, is done, and to note it down in his memorandum-book. The following list of the most celebrated painters may, perhaps, be of some service to introduce the study we have just recommended.

Historical-Painting.

ITALIANS.

In historical painting, among innumerable others, is the celebrated Raphael Urbino. Most of his works are in Rome and Florence, he has likewise done many pieces, which are now in other countries. At Hampton-court are the seven famous cartoons* of his performance. He was born in 1482, and died, aged 37 years. In his designs he was very correct, and his study was, in his draperies, much after the antique.

Michael Angelo Buonarroti died 1564, aged 90. He excelled in naked figures in his paintings. Most of his works were done at Rome and Florence.†

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* The cartoons are said to have been removed to *Windsor Castle.*

† There were *five* Italian painters of the name of *Michael Angelo*; but *Buonarroti* and *Caravaggio* are the two which are most celebrated.

Titian died 1576, aged 99. His paintings, in his younger years, are delicate and agreeable, both near and at a distance; but those done in his latter years, are viewed to more advantage at some distance. His works are chiefly done at Ferrara, Mantua, and many other places, particularly at Venice.

Giacamo Tintoretto died 1594, aged 82. He was very rich of invention, and most of his paintings he did at Venice.

Paul Veronese died 1588, aged 50. He painted large and laborious pieces, with a multitude of figures. he excelled in draperies, and most of his works are at Venice and Verona: he has painted likewise in several other places.

Giulio Romano, Raphael's disciple, died 1546, aged 54. He imitated his master very closely. He was happy in his inventions. He has done much work at Rome; but the most in Mantua.

Annibal Caracci died 1609, aged 54. He excelled chiefly in *al fresco*, wherein he imitated the famous Coreggio, both in bold designing, and uncommon position and postures. Most of his works are done at Rome.

Pietro de Cortona, aged 60, was famous about 1635. He excelled chiefly in ceiling-pieces. His single paintings are very scarce to be met with. Rome and Florence have the most of his performances.

Carlot, lived at Venice, and excelled in naked figures, which he did to admiration.

FRENCH.

Simon Vovet painted much at Paris; and, as it were, introduced the *true art* in that city, among the rest of the French painters. He died 1649.

Nicolas Poussin died 1665, aged 70. He imitated Raphael in designing, and Titian in colouring. He painted much at Paris, but more at Rome, where he chiefly resided.

Charles le Brun, an excellent French painter, died 1690. His paintings are of admirable beauty, both for designing and colouring. The most of his performances are at Paris and Versailles.

Eustache le Sieur, died 1655, aged 38, a disciple of Vouet. His paintings are chiefly at Paris.

Blanchart, died 1638, a native of Paris, where are most of his performances. He was excellent for his colouring.

Pierre Mignard, died 1695. He excelled in history, and was, next to Le Brun, very pleasant and beautiful in his colouring.

Noel Coypel, was director of the academy of painters at Paris, who, together with his son, excelled in pleasant inventions and beautiful colouring.

Jean Juvenet, one of the most famous French history-painters.

Philip Champagne, has painted much at Paris.

Boulogne, and Corneille, two celebrated history-painters, made themselves esteemed by their performances at Paris.

FLEMISH AND DUTCH.

LUCAS van Leyden, died 1604, aged 71. His chief excellency was in draperies.

Peter Paul Rubens, died 1640, aged 63. He had a peculiar method of colouring, almost inimitable. He excelled in the expression of the passions, and in naked bodies, both of men, women and children. His paintings are held in high esteem. He not only painted in the Netherlands; but likewise in Rome, Mantua, Paris, Madrid and London. The fine ceiling of the banqueting-house of Whitehall is of his performance.

Gerhard Hundhorst, died 1660, aged 78. He painted with dark yet pleasant shades. Most of his performances were at Rome, and near the Hague in Holland. He has likewise made himself famous by his pencil here in England.

J. Jordans, died 1678, aged 85. He was indefatigable in his endeavours to gain the reputation of a more eminent painter than Rubens. His chief performances are at Antwerp, Amsterdam, and about the Hague.

GERMANS.

Albert Durer, whose mark is $\overset{A}{D}$, died 1528, aged 57, was a great master in draperies; his genius was universal, both with respect to painting, and cutting his designs in wood.

Christopher Amberger, lived about 1530. He excelled in *al Fresco*. Of his performances the most are at Augsburg and Munich.

Matthew von Ashaffenburg, died 1510. One of the best German history-painters. His chief performances are at Francfort, Mentz, Eisenach, and other places in Germany.

Hans Holbein, the elder, has painted much in Augsburg. He was famous in 1499.

Hans Holbein, the younger, made himself famous by his painting at Basil; from whence he came into England, and was in high esteem at court. He died 1554, aged 56. He was admired by the Italian painters, who endeavoured to imitate him in his colouring.

Christopher Swartz, died 1594. He got himself renowned by painting *al Fresco*. His principal works are at Munich.

Adam Eltzheimer, excelled in draperies and small figures: he likewise painted very good night-pieces. He died 1630, aged 50.

John Lys, alias Pan. He painted in imitation of Paul Veronese. His chief performances are at Venice and Amsterdam, though he was a native of Oldenburg.

Rembrandt died in Amsterdam. He had a peculiar method both in his painting and etching, and maintained that a painter ought to copy nothing but nature. His portraits are striking likenesses: he excelled in painting of old heads. He painted most in Amsterdam, where he died in 1629.

Carl Screta, of Prague, who died in the 60th year of his age. His paintings are beautiful, and his inventions pleasant and agreeable. He painted large history-pieces, in which he endeavoured to imitate nature. Most of his performances are at Prague.

Joachim de Sandrart, died 1684, aged 78. He made himself very famous by painting at several illustrious courts. His works are the admiration of the curious at Rome, Francfort, Munich, Saltzburg, Vienna and Holland.

Joh. Henr. Schönfeldt, of Augsburg, born 1619. He excelled in beautiful colouring. His works are chiefly at Munich, Saltzburg, Inspruck and Augsburg.

Landscape-Painting.

ITALIANS.

Hyeron Mutian, who chiefly painted at Rome, and Titian, were the best landscape-painters in their time, when painting of landscapes was but little regarded among the Italian painters, who excelled chiefly in history-pieces.

Ambrosio Lorenzetto, died at 83 years of age. He had an excellent hand at colouring his skies, and the first that brought painting of landscapes into repute among the Italian painters.

Giacomo Bassano, flourished in 1600. He painted chiefly at Venice, and his landscapes, especially in night-pieces, are much admired.

Salvator Rosa, of Naples, painted very good landscapes with cattle, and sometimes battles and banditti. He chiefly painted at Rome.

Giovanni Soens, of Antwerp, lived and learned to paint in Italy, and excelled in landscapes above all the Italian painters.

FRENCH.

Bordon, formerly director of the French academy of painting. He has painted much in landscape, at Rome, and all over Italy; at Paris, and other places in France; also at Munich in Bavaria.

Champagne and Molon were in high esteem at Paris, on account of their excellent painting of landscapes; as were Forest, Heroult, Parossel and Despottes, &c.

FLEMISH AND DUTCH.

CORNELIUS Molinäer, of Antwerp, died 1602. He had a quick and accurate hand, and excelled in trees.

Lucas Gassel, excelled in landscape, though they are done with a slight hand. He chiefly painted at Brussels.

Jacob Grimmer, of Antwerp, excelled in skies.

Joachim Patenier, of Dinant, not only painted fine landscapes, but introduced very good figures into them.

Paul Briel, of Antwerp, died 1622. He painted chiefly at Rome, and his pieces are, though small, very valuable.

Peter de Laër, alias Bambots, died 1650, aged 60, excelled in small landscapes, wherein he expressed every thing very natural, though some of his pieces were not above an inch square. He painted chiefly at Rome, and, before his death, at Haërlem, his native place.

Will. Bemmel, was one of the best lanscape painters. He has painted much in the Netherlands and Germany, particularly at Nurimberg and Augsburg.

GERMANS.

Claudius Gelli, of Lorrain, has chiefly painted at Rome, but his works are dispersed all over Europe.

Joh. Will. Bawer, died 1640. He was an incomparable genius for fruitful inventions, not only in landscape, but for painting in general.

Elizheimer, who already has been taken notice of among the history-painters, in painting of his landscapes, excelled in night-pieces.

Harmes, of Brunswick, excelled in painting good perspective in his landscapes.

Portrait-Painting.

ITALIANS.

TITIAN, who has already been mentioned among the history-painters.

Tintoretta.

Marietta, Tintoretta's daughter, who died 1590, aged 30, at Venice, painted most excellent portraits of great families.

Dominico Beccafurnio, died 1549, aged 65. He painted a good likeness in his portraits; but his positions in them were not extraordinary.

Sebastian Bombelli, was the most famous portrait-painter, in his time, in Italy. He painted most in Venice; and most of the illustrious persons who resided there, had their pictures drawn by him. His pieces are done with a very soft colouring, and the eyes are very lively.

FRENCH.

Migniart and Richout; as likewise Ferdinand and Le Fevre; all most excellent masters.

Lagrillirie has likewise gained great renown by his incomparable colouring.

FLEMISH AND DUTCH.

Ægidius Mostart van Hoest, died 1598. He painted most at Antwerp.

Martin de Vos, died 1604. He painted his portraits very lively. Most of his work was done at the city of Antwerp.

Jeremiah de Wingen, of Brussels, died 1748. He painted, for the most part of his life, at Francfort.

Cornelio Kettel, made himself distinguished for face-painting, not only in Holland, but likewise in England.

Michael Janson Mierveld, of Delft, died in 1558. He is said to have painted upwards of 10,000 portraits.

Gabriel de Hundorst, who being a good history-painter, excelled at last in painting of portraits.

Anthony van Dyke, the most famous portrait-painter, died 1641. He followed the manner of Titian; and has gained great reputation by his paintings in England, Venice, Rome, Genoa, Holland, and the Netherlands.

GERMANS.

The German portrait-painters have distinguished themselves in this branch, and gained great reputation. We shall take notice but of a few.

Holbein, junior, who already has been mentioned among the history-painters.

Albert Dürer, also mentioned in another department.

Lucas Kranach, died 1553, aged 81. He painted a great number of portraits in profile, on wood; he finished the hair to admiration. He chiefly painted at the court of the elector of Saxony; but his pieces are now distributed in the collections of the great, all over Europe.

Bartel Böhm, of Nurimberg, is but little known but for those paintings he did between 1520 and 28, which are marked with BB. He is accounted one of the best portrait-painters. Some of his pieces are in the electoral palace of Munich, and are esteemed very valuable.

Daniel Block, (died 1661, aged 81,) made himself a famous portrait-painter, by painting at the several courts of Sweden, Denmark, and Mecklenburg.

Emanuel Block, the son of Daniel Block, excelled his father in painting of portraits, and gained great honour and reputation at the imperial court at Vienna, at the electoral court of Dresden, and at several others.

David Klokner, of Hamburg, died 1699. He, for the most part, painted at the Swedish court, where he gained the fame of being the greatest artist in Europe. He lived to the age of 59 years, and had, before his death, the honour of nobility conferred upon him.

Sir Godfrey Kneller, was born at the city of Lubeck. He, for the excellency of his pencil in painting of portraits, received the honour of knighthood from king William, in England, where he resided, and did the most of his work. At Hampton-court may be seen the several beauties of his performance. The picture of king George I. in Guildhall, was done by him; and to his memory a fine monument is erected, with his busto, towards the north-west side of Westminster-Abbey.

Still-Life.

THE most celebrated hands in painting of still-life are Joachim Bucklaer, of Antwerp; and George Flegel, of Francfort; but particularly in eatables and fruit.

Shipping Pieces.

HENRY Cornel. Vroom, of Harlem, is famed for painting of sea-pieces and shipping; as is Van der Velde.

Battle-Pieces.

In painting of battle-pieces, Michael Angelo de Marco, an Italian, and John Philip Lembke, of Nurimberg, got great reputation.

Grotesque-Painting.

In grotesque-paintings the Italians have the pre-eminence; and particularly one Mortuus Feltrensis, who made himself of great note in his performances that way.*

Flower-Pieces.

In flowers are particularly famed Marcel, of Francfort, and Joh. Andr. Grav, of Nurimberg, together with his wife Maria Sybilla Mariana. Old John Baptiste has painted much here in England: the paintings of the stair-case, and other parts of Montague-house, are painted by him.

Drollery.

By painting of drolleries, or low-life conversation pieces, Andrew Brower made himself noted; as did Peter Breugel; both of Flanders.

Live-game.

Barlow, an Englishman, got great reputation in painting of poultry and game.

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* The compiler might have added Raphael, whose *lodges*, as they are termed, are the most wonderful performances in the world. They are in the Vatican at Rome.—*Ed.*

This will suffice for the present, as it is not intended to give an account of the lives of painters at large, but only to raise a desire to inspect the history of them, in books that are published about them.

OF THE ART OF SCULPTURE.

To obtain a true taste and judgment in sculpture or carving, we must follow the same rules and orders as have been observed in the art of painting, and, first, be informed of the materials that are commonly made use of. They are clay, wax, wood, plaster of Paris, stone, marble, lead, metal, ivory, gems, glass, and steel.

The ancients have made many works out of *clay*, which they formed in various kinds, and then brought it by fire to hardness; but it being found by experience that this method greatly changed the form and shape in the fire, they thought proper to make choice of other materials. At present clay is only made use of for modelling, and no statue or other figure is carved in stone, marble, &c. after it is modelled in clay. This is done with three or four instruments of wood, formed for that purpose, of different sizes. Some are only done by the fingers' ends, and moistened pencils, by which they are smoothed and polished.

Wax is likewise chiefly used for modelling of figures, but there are many artists, who model portraits to the greatest likeness; likewise all sorts of fruit, flowers, and other things, in imitation of nature, to admiration.

In *wood*, not only the ancients but the moderns have performed very curious works. At present it is seldom used for capital pieces, but chiefly in ornaments, and embellishments of architecture.

In dry places we find frequently statues of *plaster of Paris*, which are either modelled by hand, or else cast in moulds. The former are made in this manner: first an iron bar is fixed into a pedestal, which is bent according to the attitude the figure is to stand in, reaching from the foot up to the head; from this bar proceed strong wires bent to the motion of the arms, hands, feet, or wings, these being in a right position, the artist covers every part with coarse plaster of Paris, or lime; then with his tools he forms it after the draught or model he has before him; lastly, laying it over with fine plaster of Paris, he, with his modelling-sticks, finishes the whole. If from this original he wishes to take a copy, he anoints or smears it over with nut-oil, or hog's-lard, and covers one part after another of the figure, first with fine plaster of Paris, and over that with a coarser sort; having thus covered one piece, it is struck off, and a notch or mark being made across the split, it is tied together, and the next part to that is again anointed over with hog's-lard, and covered first with fine, and then with coarse plaster upon that; thus he proceeds till the whole has been successively covered; all the pieces being tied together, and thoroughly dry, it is untied, and taken off piece by piece, which may be joined afterwards and tied together, and the figure cast in plaster of Paris, sulphur, or wax; taking particular care that the mould be well anointed with oil, or hog's-lard, before you make use of it.

Stone and Marble are used for capital pieces; and, although they require expence, pains, and labour, they make amends in being durable. It is requisite to have an accurate model before the work is begun. The stone or marble is first cut into a cone, the height of the figure, then an exact measure is taken by the model of all the extending limbs of legs and arms, and the ends of them marked with a piece of coal. After which, the hollows are cut out in coarse pieces, and brought to some tolerable form and shape, and so by degrees it is worked with finer tools, and finished to perfection, after the model.

Statues of *lead*, and *other metals*, are cast in moulds; the former are more easy and less expensive than the latter: those of lead are always either painted or gilded, but the latter are preferred of their own colour. Of leaden statues may be viewed the equestrian one of his majesty king George I. in Grosvenor-square, which is gilded; as is that of his majesty king George II. in Leicester-square. Of the statues cast in metal, are principally to be taken notice of, 1. The equestrian one of king Charles I. at Charing-cross; the statue of king Charles II. in Chelsea-college; and that of king James II. in Privy-gardens.

Ivory is made use of in carving, only for small pieces. The artist must not only be very curious in his performance, but be likewise blessed with a large stock of patience. These pieces done by eminent hands are disposed in cabinets.

To cut in *gems* or precious stones, is an art which was very much encouraged by the ancients, both Greeks and Romans. They are to this day in much esteem, and kept as choice jewels, among other collections, in cabinets. There are but few of the moderns that have excelled in this art.

Glass, of various colours, is made use of in making of small figures in basso-relievo. The glass is melted in moulds made of tripoli, or such as will stand the fire.

Steel is only graved in stamps, or hollow mouldings, for coining of medals.

Having thus briefly shewn the materials of statues and other figures, in sculpture and casting, we now come to consider their various kinds, which may be ranged in the following order: 1. Whole-length statues. 2. Bustos. 3. Basso-relievos. 4. Armatures. 5. Vases. 6. Frames, and carvings for pictures and architecture.

1. Statues are divided into antique and modern; likewise into the naked, and with drapery; also into sitting, standing, equestrian; and into single and double.

England is possessed of varieties of antique sculpture, nay, perhaps more than any other nation, except that of

Italy; but the palaces and seats where they are lodged or deposited, are difficult for strangers to come at.

Of modern statues, we may see a great variety in and about London and Westminster; as the equestrian statues already mentioned. The statue of his majesty at Somerset-house, is judged to be of excellent workmanship.—Among the statues of the kings in and about the Royal Exchange, those on the south front, of king Charles the first and second, are looked upon by good judges to be best performed. In the middle of the 'Change is the statue of king Charles II. in marble, on a curious marble pedestal. In St. Paul's Church-yard the marble statue of queen Anne. But the greatest number of marble statues may be viewed without obstruction or trouble in Westminster-abbey: some are done by excellent hands, as are those in the monuments of the duke of Argyle, Shakespeare, Sir Isaac Newton, Dr. Radcliff, and others. The two figures on Bethlem-gate are deemed the best in England, of modern sculpture.

2. Bass-relievos are sculptures raised only half, or but a little from the surface or ground; as is the carving on the pedestal of the Monument in London, and that of part of the monument of the duke of Argyle, in Westminster-abbey; and others.

3. Armatures, are trophies or emblems, and signs of victory, composed of instruments of war, and figures of slaves chained on each side.

4. Vases, are carved vessels, which by the ancients were done in a very curious manner. The fashion of them is still kept up at this time; and no little cost is bestowed on them for the embellishment of gardens*. The royal gardens at Hampton-court are furnished with some very magnificent ones of marble.

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* A manufactory of beautiful vases and figures is carried on near Westminster Bridge, under the name of *Coade's Artificial Stone*.—*Ed*.

5. Busts, are portraits of princes, heroes, and other persons of rank and quality. In Westminster-abbey are a number of them, as Milton, Dryden, Gay, &c.

6. Frames, comprehend all the borderings about a basso-relievo, chimnies, paintings, &c.

The carve-work in architecture has these particulars; it is not allowed to introduce any thing of history, or ornament, but what is found in antique buildings; and these may be easily gathered from books, and prints relating to architecture.

Before I conclude this subject, I shall only observe, that statues are chiefly to be examined by their proportion, and whether the muscles are in their right position; whether the limbs are according to the age and circumstances of the figure, and whether the drapery is free and easy. In the naked, the ancients excelled; but the moderns in drapery.

OF ENGRAVING AND ETCHING.

Engraving on copper-plates being a liberal art, and it having arrived to the greatest height of perfection, all lovers of ingenuity are thereby roused to the exercise of drawing, that they may proceed in etching or graving their own designs on copper.

In order, therefore to satisfy their inclination, and to guide them, the shortest and easiest way to know that charming and delightful employment, I have, to the best of my experience, presented them with the following rules:

I. It will be requisite for every one that intends to set about this work, to follow the rules already given for designing or drawing, and particularly to use his hand to that manner of shadowing with the pen, shewn in *plate* III. *fig.* 4.

II. Before he sets about etching or graving, he ought to be furnished with the proper implements for that purpose, which are the following:

1. Some ground, or wax, for etching; the preparing of which shall be taught hereafter *.

2. Some needles, fixt in long wooden handles.

3. Some gravers of different sizes, fixt in short round handles, the one side whereof is towards the sharp point of the graver, cut close to the ferrel, in order to have a freer command with the hand, when made use of.

4. A sand-cushion, which is of leather, sewed together in a circular form, and filled with sand. This is to turn and move the plate upon.

5. An oil-stone, to grind and set the gravers upon.

6. Some green soft wax, likewise some wax tapers.

7. A bottle of single aqua-fortis, a burnisher, some sweet-oil, and some soft charcoal, and linen rags.

8. A copper-plate, of the size to answer the design.

Being provided with all these tools and implements, and having the plate well polished and burnished, you take a piece of the etching-wax, etch-ground, or varnish, and wrap and tie it up in a black piece of silk taffaty; and, having heated the plate, which is screwed tight at the edge in a little hand-vice, over a charcoal fire, or with some lighted paper on the back-side, you with the varnish daub over the polished side, and, whilst hot, with another little bag of taffaty filled with cotton, or a fine feather, spread the wax smooth and even upon the plate, so as the plate may be covered in one part as much as the other. Then take a piece of a wax flambeaux, or small wax tapers six or eight double, lighted, and hold the waxed side of the plate over the smoke; and having blacked it all over, of an

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* All the necessary implements for drawing, etching, and engraving, may be had at the print-shops in Great Newport Street, Leicester Fields.—*Ed.*

an equal colour, set it to cool. Care must be taken not to hold the flame too long in one place, lest it should scorch or burn the wax, and oblige you to do your work over again.

This being accomplished, and the plate cold, you colour your design with red chalk, and trace it over the plate with a blunt needle fixt in a long round handle, like the others. But if you preserve your drawing, or print, you must first trace it upon a piece of plain oiled-paper, and from that upon the plate. You now take one of your needles, and go over the out-line of your piece; after which, you bring in the shadows, using a finer needle for the distant and fainter strokes, and a larger for what comes more forward, and upon the fore-ground. In performing this you must be very exact and careful, so as to blend your shades in one another, to make them agreeable to the eye when the plate comes to be printed. For straight strokes, be they single or crossed, you make use of a parallel-ruler. The work with your needle being done, examine it well, if any thing inadvertently be omitted, that you may save the trouble of doing it afterwards with your graver.

Being ready to *bite-in* (as it is termed) your plate with aqua-fortis, take common green wax, spoken of before, and soften it in luke-warm water, so as to work it with ease between your fingers, and raise a border or inclosure round your work, about an inch high; after which, pour on your aqua-fortis; in doing of which, if you find your work presently to raise in bubbles, it is a sign the aqua-fortis is too strong; you, therefore, must have a bottle of water ready at hand to lower it. Whilst the aqua-fortis is on the plate, you, with a duck-wing feather, break the bubbles that rise upon the etching, and, letting it stand for a quarter of an hour, you pour the aqua-fortis off the plate, and rinse it with fair water, rubbing some of the etching-varnish over that part of the work that is to be kept in the distance; *i. e.* finding it deep enough to shew the distant view, you dry the plate at some distance from the fire, and, having in the mean while mixt lamp-black with a thin varnish, you, with a pencil, cover the places that are to be of a fainter colour afar off, pouring the aqua-fortis on again, to penetrate deeper for the second colour; when you perceive it has stood long enough upon your work, pour off the aqua-fortis, and proceed as before, a third time, for the fore ground or the deepest colour; when you judge it to have stood long enough, pour the aqua-fortis from off the plate, and rinse and dry it. examining it carefully; in case it be not deep enough, you pour the aqua-fortis on again for a little while longer; but if you find it has its proper colour, take off the bordering, rinse the plate with clean water, fasten it to your hand-vice, and, with a lighted paper, heat and melt the wax, and wipe it off the plate with some linen rags, pouring some oil upon the plate to clean it from the sharpness that may remain in the strokes of the aqua-fortis. Your work being thus far finished with relation to etching, you must examine your plate by your drawing, or the print you copy, and see what is left to be done with the graver, to give it the finishing stroke: for which purpose you take the sand-cushion, and laying thereon your plate, you sweeten the shadows with both bold and delicate strokes; for the latter of which you use a dry needle, as it is called. and therewith go over the tender shades, as likewise the most distant sky: and when you think your work complete, then, through a rolling-press, you take an impression at a copper-plate printer's, which will plainly represent your work in its beauties or deformities. If you see any errors committed in your first attempt, you must not be discouraged, but endeavour to improve in your next, by avoiding those mistakes you committed before; and, by such means, advance and grow more perfect, till you have obtained a true and experienced knowledge, and are become master of the art.

Receipt for the Etch-ground, or Varnish.

TAKE three ounces of asphaltum, powdered and sifted; two ounces and an half of virgin-wax; half an ounce of frankincense, and half an ounce of nut-oil, melted together.

PART XII.

NIGHTINGALE AND CANARY-BIRD;

WITH NOTICES OF A FEW OTHER SINGING BIRDS.

IT will be needless to enter upon a serious panegyric on the charming notes of these melodious songsters, or to describe the symmetry of their form and beauty of their features: the delight and satisfaction they bestow upon their keepers, render them the daily subjects of our praise. In treating of these birds, we shall begin with the

NIGHTINGALE.

A SAXON word is said to form the etymology of the name, viz. *galan*, "to sing," combined with *night*; as the *nightingale* pours forth its strains in the lonely hours of repose. These vigils did not pass unnoticed by the ancients, who have remarked that "to have less rest than "a nightingale is a sign of a bad sleeper."

Our favourite poet Milton omits no opportunity of introducing this lovely bird. How finely does it serve to compose the solemn scenery of his *Penseroso!*

"In her saddest, sweetest plight,
Smoothing the rugged brow of night;
While *Cynthia* checks her dragon yoke
Gently o'er th' accustom'd oak.
Sweet bird, that shunn'st the noise of folly,
Most musical, most melancholy!
Thee, chauntress, oft the woods among,
I woo to hear thy *evening song*."

In another place he styles it the *solemn bird*; and he says, again—

"As the *wakeful bird*
Sings darkling, and, in shadiest covert hid,
Tunes her *nocturnal note*."

We hope the reader will pardon one or two more quotations on a subject so truly engaging to the mind.

The same poet, describing the retirement of animals to repose, says—

"Silence accompanied; for beast and bird,
They to their grassy couch, these to their nests,
Were slunk, all but the *wakeful nightingale*,—
She all night long her am'rous descant sung."

Whe

When Eve passed the irksome night preceding her fall, she, in a dream, imagines herself thus reproached with losing the beauties of the night:—

> "Why sleep'st thou, *Eve*? Now is the pleasant time,
> The cool, the silent; save where silence yields
> To the *night-warbling bird*, that now awake
> Tunes sweetest its love-labour'd song."

We now proceed to the more immediate subject of the Chapter.

Extract from a French Treatise, on the Art of catching, feeding, and keeping of Nightingales.

THE Nightingale has ever been allowed the first rank among singing-birds; his size is less than a sparrow's, weighing hardly an ounce; his bill is long and pliant, and when opened, discovers a wide orange-coloured throat. The feathers of the head, neck and back, are sallow; the wings and tail brighter than the rest of the body. The hen is a little more upon the ash-colour. This bird loves solitude: some resort in mountains, some in fields, and some near the banks of rivers. It is admirable from so small a body to obtain such charming sounds! One of the greatest pleasures the country affords, in the summer season, is listening to the rural melody of the nightingale, which exceeds not only that of any other singing-bird, but no instrument can vie with it. At his return in the spring, his voice is much stronger than towards autumn. When the young are hatched, the cock sings no more, or but very little: if young ones are taken before they have learned their lesson from their parents, they never will sing so well as others.

Nightingales take great care of their young: the old cock instructs them in singing; he repeats his lesson, and they attentively hearken to him. What Gesner relates, as communicated to him in a letter from a friend of his, concerning the dialogue in High-Dutch between two nightingales, has too much of the miraculous to insert here: it would be of little use to the reader, and therefore we shall omit it altogether.

A nightingale cannot endure much cold; and if, when in a cage, in the winter season, he is not kept warm, he will soon perish. What becomes of the nightingales in winter is not quite agreed on; however, it is the opinion of some, that they do not pass the sea, but shelter themselves from the cold, without leaving the country: sportsmen aver they have killed many in winter, that have concealed themselves in quarries, and other places, exposed to the south.

The ordinary resort of nightingales is near hills, or brooks: of these favourite places, he prefers that which has the advantage of an echo. Whilst the hen is laying her eggs, and more especially when she sits, the cock utters his most beautiful notes, and redoubles, night and day, the energy of his song, to divert and comfort his female from the pains of laying and the fatigue of sitting.

The nightingale builds his nest, usually among briars in box or yew-trees, or at the foot of a hedge or a bush; for which reason, many layers of eggs are destroyed by dogs, foxes, weasels, polecats, &c. The nest is pretty long and deep, consisting chiefly of dry oak leaves. In hot climates they will produce four layers of eggs in a year; in this country but three, at most; the third seldom comes to any thing, on account of the advancing cold nights: they commonly lay four or five eggs, which look as if they were splashed over, and are hatched more by cocks than hens. The fittest time to look for nests is in the morning at sun-rising, or in the evening towards sun-set, near the place where the cock has been heard to sing, which commonly is not far from the nest; there you are to remain still, without making the least noise; and before long, you will know whereabouts the nest is, by the cock and hen flying backwards and forwards, and by the chirping of the young ones.

Of the Time and Manner of catching Nightingales.

THE right time for catching nightingales is the month of April; the sooner they are caught after their re-appearance, the longer they will continue to sing. In May they are paired; and it will be a long while before they sing when caged, and then their music is but short and trifling. From sun-rising to ten in the morning is the best time for catching them: they, having fasted all night, are eager after food, and greedily seize upon meal-worms. In a wood you may easily make choice of a nightingale which sings finest; they keep at a distance from one another, and seldom invade each other's bounds: you go, the evening before you set your trap, and mark the place where you hear them; you then cut a twig about four feet long, sharpened at one end, and slit at the other, so as to hold a couple of meal-worms stuck upon a pin, thrust the point into the ground, about twen[illegible] thirty paces from the place where you hear the bird sing, so that he may easily espy [illegible] and turn up the earth round the twig; this do where [illegible] you hear a nightingale. Next morning repair to the place where you planted your twigs; if you find all or any of the baits gone, you may conclude the nightingale will soon return, in expectation of a fresh supply; you, therefore, are to set your trap near the twig, in as private a place as you can, yet so [illegible] leave him a full view of the meal-worm; and turn up the fresh mould, which will invite the nightingales to come and look for worms, ants, or other insects. If he should spy you placing the trap, you may depend on his coming to it soon after you are retired; and if he should be gone to some other place, you will soon find him out by his singing; then throw a stone at him, and he will directly repair to his former station. When he is caught in the trap, you must carefully seize him by his legs, and disengage him from the net, slipping him immediately into a little silk purse, at least six inches long, and two wide, taking great care not to rumple his wings or tail, which would greatly retard his singing. To avoid the inconveniency of a net, in which the bird, endeavouring to escape, is apt to entangle himself, some make use of a piece of thin green silk, of which he is no more shy than of a net; and thus the feathers are secured from the least damage.

Having caught the bird, on your return home you are to fix the cage on the outside of your window, where you let it remain all the singing-season, supplying him with meat and drink as shall be directed. The wires of the cage must be quite covered with a piece of green serge, or cloth, to exclude the light. It is absolutely necessary that this cage should be exposed to the *east* as much as possible. The heat of the south fatigues the bird, and prevents his singing; besides, it dries him up and he will be apt to grow blind.

Having placed the cage as directed, you must shelter him from the rain and the sun by an umbrella, or a boarded covering. Some set the cage upon a small table within the window: but then the casement must be [illegible] night and day, and no body must come into the room, but the person that takes care of the bird; who must give him his meat and drink as softly as possible, and without jarring the cage. Thus managed, the nightingale will sing sometimes in three or four days, and will never exceed eight, if he is caught before May. You place two small cups in the cage; in the one put water, in which strew three or four meal-worms; in the other, put between twenty or thirty meal-worms, for his food. In caging the nightingale, you must open that end of the purse next to his head. When he is half way out, you must make him swallow a few drops of water, for refreshment, by dipping his beak again and again into it; then let him slip out into the cage, closing the door after him. The bird will, for some time, be sullen under his confinement; but the meal worms will soon revive his spirits, and make him forget his loss of liberty. You may visit him about four hours after caging; softly open the door of the cage, take out the cup with meal-worms, and supply him with fresh ones, covering the bottom of the cup with a little paste. Visit him again about seven in the evening, giving him a supply of fresh worms, some of which you cut in two, that the paste may cling to them, which the nightingale swallowing, will be insensibly brought to like. The next day, give him twenty-five more, at eight in the morning; as many at noon; and also at seven in the evening, (all cut in two, and mixed with a little of the paste). You must be careful not to stir the cage, for that would make the bird wild; neither must you suffer him to see you. Continue thus the third day, only now cut the worms in three or four pieces, to mix the better with the paste. Thus go on for three weeks, when you are gradually to lessen the number of the meal-worms, and increase the quantity of paste, according as you find him relish it. For some will take to it sooner than others: it is no small advantage if they are soon reconciled to this sort of meat, for it makes them stout, and they will continue longer to sing. If you can easily procure meal-worms, give the bird ten or fifteen, three times a day, during the whole singing-season. Remember you put not your meal-worms into glass, for the birds seeing them through the side of the transparent cups, will endeavour in vain to seize them, and so are starved to death. To make a nightingale sing, you must darken him up on all sides. This little creature is so timorous, that he is terrified at every thing he sees, and flutters till he kills himself against the wires of the cage; but being kept without light, he rests himself content with eating and drinking.

Of the Construction of the Trap for taking Nightingales.

THE trap for taking nightingales is very simple and commodious, as it may be carried in one's pocket; and it is very sure in its performance.

Make a semi-circle, (*See fig.* 1. *pl.* 22.) C A C. of iron-wire half the thickness of your little finger, and eight inches diameter. There must be a hole or loop at either end, C. C. through which put a double string of well-stretched packthread, fastened at each end. Between the packthreads must be fastened the extremities of a second iron semi-circle C. F. C. by means of two flat pieces of iron G. G: this should be of wire of the size used for the largest parrot-cages, and must be turned and shaped as represented in the figure. To the two semi-circles must be fitted the silk net E E; which should not be straight, but rather a little loose, so as not to confine the bird too close when taken. Every thing thus disposed, a wooden pin H, pointed at the end, must be introduced between the packthreads, to twist them to a sufficient tension, and then stuck into the ground, quite up to the head. This done, the semi-circle C. A. C. must be confined flat to the ground by the wooden crook I; and the other semi-circle C. F. C. be pulled open, and kept so by a kind of trigger, wherein are cut two notches near the ends, for receiving and keeping asunder the semi-circles, as in the figure. This trigger is baited with meal-worms, stuck on with pins: then the net is to be spread flat, by drawing it from the middle towards the circumference of the trap, and thrust under the wire circles, to prevent its being entangled with the trigger when the trap falls. Care must be taken, that when the net is spread and the trap set, the semi-circle F, may rise about two inches above the ground, to hinder the nightingale from seizing the bait without going into the trap.

Lastly, the trap must be contrived so as to fall easy, and clear of any stone, bough, or briar.

There are three sorts of nightingale cages: 1. The dark one, wherein they are kept from the time they are taken till the season for their singing is over. 2. That into which they are to be removed after that season. 3. The cage for blind nightingales.—The first should have three of its sides of thin wainscot or deal, with the face only wired, sixteen inches long, fourteen high, and ten deep, the wireing to be covered with green serge, nailed very close. The door should be at the bottom of one side, big enough to admit your hand, and should open at the lower part, for the easier conveyance of the cups with the meat and drink: the face should be of slender sticks rather than wire, the hardness of which would be apt to hurt the nightingale's tender feet, or to break his feathers when he flutters; which accidents would greatly retard, if not entirely spoil his singing. On the top of the cage, just over the cup that holds the paste, may be made a hole, and in it a little tin funnel, through which you may drop the meal-worms, and thereby prevent putting your hand three times a day into the cage, covering the funnel to keep out the rain; for the least wet would spoil the paste. In this cage the nightingale is to remain till he has done singing, which commonly is about the 20th of June, and then you take him within doors; but keep him still dark for a fortnight longer, when you may begin to open the serge a little at bottom; thus continuing every day by little and little the bird will gradually be reconciled to the objects about him. After a while you may take him out, and put him into the second cage, wherein he is to remain.

During the bird's dark confinement you must not attempt to clean out his cage, because it would certainly make him wild, and spoil his singing; nor is it anyways necessary, since he always keeps upon the perch, but when he descends to eat or drink.

The second cage only differs from the first in being open before, with a door in the middle of the wires, and a draw-board at bottom for clearing away his dung.

When you give the bird meal-worms in the new cage, it will be best to leave them among a little moss at the bottom, or let him take them out of your hand. If you mix them among a little paste, he will be apt to scatter it about to get at them. To give him too many will make him lean and phthisicky.

The third sort of cage is for nightingales that are grown blind, or as have been blinded on purpose. This should not be above seven inches and a half long, eight and a half high, and four and a half deep, of very thin wainscot, with only the front open. The cups to hold his meat and drink must be placed on the outside of the cage, as is usual for common birds, under an arching of wire, that large holes may be made in the wooden sides, for his more easy finding his food; there must likewise be a draw-board at bottom for clearing away his dung, and a door in the top to put him in at. Lastly, there must be three perches parallel to one another, and even with the cups, one in the middle of the cage, and one at either end, an inch and a quarter distant from the feeding and drinking holes.

Of breaking Nightingales.

CATCH a pair of old birds about the end of the spring, in the manner as you have been directed before; than set two traps baited with meal-worms very near the nest, by which means you will soon have both cock and hen; and having brought them home with the nest of the young ones, put them altogether in a dark closet, where not the least light can appear. Their meat and drink you may place near them in two cups, and in a third about fifty meal-worms, and this you do every day as has been prescribed about nightingales newly taken; thus you will soon see the cock and hen fetch the meat and meal-worms to feed their young: their meat should be one half bread, the other bruised hemp-seed, and minced boiled beef, with a little parsley; and now and then some yolk of egg boiled hard, or the paste to be described hereafter, mixed with equal parts of raw sheep's heart, or beef, finely minced, without any skin, fat, or sinews. The affection these creatures have for their young ones, causes them immediately to set about nursing them in their confinement. As soon as they can feed themselves, you may put the cock and hen in two separate cages, where they are to be kept the whole winter, till the next spring; but in case the eggs should not be hatched when you take the old ones, you must content yourself with the birds only, which you keep separate, but in the same closet where you purpose they shall lay eggs the next spring, that they may be used to the place; for which end, you may suffer them to get out of their cages, and thus you will have a pair of nightingales prepared, in every respect, for home breeding at the proper season.

The next year, about the beginning of April, open the cages for the [illegible] season, and scatter about the closet dry oak [illegible] and dog's grass, and deer's hair, with one or two old nightingale's nests. In the corner of the closet near the window, stick fast two or three branches of slender dry twigs, tyed slackly together, letting the lower end rest on the floor; then take some handfuls of the oak leaves, and stuff them among the twigs, leaving open the passage where your hand went in, for an entrance to the nightingales: you place likewise, near at hand a small wooden tray, full of ordinary mould, and a small shallow earthen pan of water, for them to bathe themselves in, which you renew every day, but when the hen sits, you take it away. The closet should be towards the south, for the benefit of the warm sun-shine. Some persons of curious taste have inclosed a pair of nightingales in a grand aviary, or cage, built on purpose, in a proper corner of a garden, surrounded with little yew-trees, maples, &c. where they have built their nest, and brought up their young as well as in the open country.

If the closet looks into a garden, you may safely venture to take out a pane of the window-glass, and leave the old ones at liberty to go out and return, which they will not fail to do whilst their young ones are incapable of feeding themselves: at first, however, it will be best not to trust them out both together, but the cock by himself, and then the hen by herself, and, lastly, both together. Let the hole be as near the nest as may be; thus you will have the pleasure of hearing the cock sing day and night in your garden, whilst the hen is sitting; and they will have the opportunity of procuring a thousand little insects, after the eggs are hatched, wherewith to feed their young.

You must be cautious of visiting the closet too often, especially whilst you allow them the liberty of the garden; and it should be the business of one person only to look after them, which will make them the more familiar: but above all, it is highly necessary that neither dog, cat, mouse, or rat, should ever disturb them; for any of these would certainly drive them away, [illegible] to return again.

How to bring up young Nightingales without the Cock or Hen.

GET a nest of the first layer, as being ever the most stout and vigorous birds, consequently the best singers, and the least liable to fail in their moulting. You must not take the nest till the birds are pretty strong, and when taken, they should be carried home in a dark basket, with only a few breathing holes. It is a nice point to feed them properly, for to give them too much or too little is equally dangerous. Their gaping wide is no indication that they

wan:

want victuals, for this they will do whenever you come nigh them, or touch their nest; provided you understand well their language, their cry would be the most significant token; but if you do not, it will be the best to observe the following directions.

About half an hour after sun-rising give them their first feed, the second an hour after, and so on by the hour till sun-set; the last feed should be somewhat more plentiful than the rest. They should be fed by a skewer flatted at the end: give them but four mouthfuls at a time, though they would take more: you must take care not to mistake one for another, else some may be starved, and others ready to burst. At a month's end, or sooner, if they are of the first lay, they will be able to feed themselves, which you may know by presenting a small meal-worm to them; you may then separate them in different cages. The young ones being so far brought up, you may, for perfecting their song, carry them into the country to hear the old nightingales sing, else they will scarce answer the trouble which you have taken about them.

There is, however, another and more easy way, for such as are already provided with old nightingales taken with [illegible], and kept a whole twelvemonth or longer: it is this.

Take a nest of young ones, and place them in the same chamber with an old nightingale. Begin to feed the young ones with the skewer, and leave the old one's cage open day and night, taking care to place a small pot of the young one's meat close to his own feeding-trough: if you suffer the young ones to cry a little while, before you go to feed them, you soon will perceive the old bird go out of his cage, chirp to the young ones, fill his bill with their meat, and feed them. When in the morning you find that he has been distributing meat to the young ones, you may entirely entrust him with that business; for when once he has undertaken it, he will feed them till they can feed themselves, or you may afterwards have the pleasure of seeing them eat with him at the same pot, and follow him into the cage: you then put them in separate cages. By this method you will save yourself a good deal of trouble and fatigue. The old bird will take as good or better care of them than you can, and besides, will teach them to sing.

If you choose to bring them up this way, it will be best to provide yourself with a hen, and keep her a whole year in a cage, in order to be a nurse; under which management she never fails to prove one; whereas, a cock often fails in this point, nor doth he sing whilst engaged.

Of teaching young Nightingales Tunes, by whistling, or by the Flagelet.

A NIGHTINGALE is possessed of such a variety of modulations of voice, that he is of all other birds the best qualified for learning and performing different sorts of tunes; and though it must be allowed his natural song outdoes any thing that can be added to it by art; yet if you would, out of curiosity, teach him a tune or two, you must proceed after the following manner.

Perceiving, by the chirping of a young one, that he is a cock, put him into a cage covered with green serge, and let him hang in a chamber, quite out of the hearing of nightingales, as well as other birds; let him for the first week be kept near the window, or the lightest part of the room; then remove him by degrees backward to the darkest part, where you let him remain all the time of his learning; nor must he be annoyed or diverted by any kind of noise whatever, nor disturbed by people coming near him. His tune should not be whistled or piped to him too often; half a dozen lessons a day will be sufficient, two in the morning, two at noon, and two in the evening. Two several tunes are enough for one bird. The flagelet should be of the softest and mellowest tone, and not of too high a pitch. You ought not to be discouraged, though you have constantly kept on whistling or piping to a bird, even to his moulting time, without hearing any thing from him in return, but only a little chirping. The bird's voice is seldom formed before the ensuing spring, and therefore his lesson should be continued without intermission: when that season arrives, you will, with an agreeable surprize, find that your scholar has not forgot his instructions.

It has been observed, that it is naturally more easy for a nightingale to learn to sing than to speak; however, we have an instance related by Pliny of talking nightingales: he assures us, that the emperor Claudius's children had some which spoke Greek and Latin, and had some new discourse every day: he adds, that to bring them up to this they must be instructed in secret, where they can hear none but their teacher's voice.

How to have singing Nightingales all the Year.

PUT a young cock, in the beginning of December, in a dark cage, and shut him up in a closet, which you must darken by degrees, so that not the least ray of light can enter till June, when you may gradually let in the light. In this month, when others cease, he will begin to sing: then put another old cock in a like cage, and keep him in the dark till December, and as much as possible from hearing the singing of the other: air the room with a little wood fire in the chimney, during the cold of the winter, all which season he will likewise sing.

How to make Nightingales resort to Places unfrequented by them before.

Find a nest in the month of May, of the first layer, but do not take it till the young ones are at least a week old; then go early in the morning, and set two traps, baited with meal-worms, near the nest, and you will easily get father and mother in your possession in less than an hour: when you have caught them, put them in separate silk bags, and so bring them to the place where you design to fix them. Take also with you two small square cages, covered with thick green serge, without wires or perches. In taking the nest, do not separate it from the branches which support it, but cut them off, and bring away the nest and them together; and it will be best to remove the whole tree if it be a small one. Having brought it to the intended place, plant it in the same aspect as before; the nest you are to cover with wool or cotton in the transporting, to keep the young ones from getting out, or taking cold. Having fixed the nest, place the two cages, with an old one in each, so that the nest may be between them, at twenty or thirty paces distance, and let the doors of the cages be turned towards the nest. To each door must be fastened a thread forty or fifty yards long, whose ends you hold together in your hands, and concealing yourself behind some tree or hedge, pull open the doors, and suffer the old ones to escape from their cages, with the following precautions: viz. let the young ones grow hungry and chirp for their food, before you let the old ones escape, who then will readily find them; release the hen first, and afterwards the cock; then carry off the cages as quietly as you can, and come no more there that day. Thus from your window you may entertain yourself with the pleasure of seeing the old ones bring up their young, which will themselves be succeeded upon the same spot the next year.

Of

Of the Tokens of Health and Sickness in Nightingales, and how to cure them.

A NIGHTINGALE may be looked upon to be in a good state of health, 1. If he sings much. 2. If he often feathers himself. 3. If he be brisk and alert, and jerks his wings much. 4. If he roosts on one leg only, and is greedy of meal-worms; but when, on the contrary, a nightingale sleeps on his belly at the bottom of his cage, it is a sign he is either sick or sullen, provided his feet are not clogged up with dung; in which case, a little warm water in a saucer placed in his cage soon relieves him. Sometimes a little imposthume is on the bird's rump, which should be snipped with the point of a pair of scissars, and the matter squeezed out, giving him a few meal-worms to cherish him, or a spider or two, which never should be omitted at the beginning of March, be they sick or well: if he grows lean through his singing, mix poppy-seeds in his meat. When his song and moulting is over, he is apt to grow too fat, then you forbear giving him any poppy-seeds. If he be very lean, feed him with raw sheep's heart, well cleared of all its skins and fat; mince it very small, and mix it with an equal quantity of the paste hereafter described. If he be bound up, give him four or five meal-worms; and if he dungs too loose and often, sheep's-heart and poppy-seeds will bring him to rights. The cramp often afflicts them, which, if it once attack a young one, it is sure to kill him; in old ones it is generally occasioned by being too much exposed to the cold, and a warmer place will cure them. There is an odd disorder which this bird is very liable to, and may be called the falling sickness: after a few precipitate motions, he will drop from the perch on his back at once, with his legs stretched upwards, and his eyes distorted; when, without speedy relief, he soon breathes his last. The only remedy for this, is to take him in your hands, and, with a pair of scissars, cut off the hinder claws so near to the heel, as to draw a drop or two of blood; then wash his feet in white wine, of which, if he does not soon revive, make him swallow a drop warm, and he will be quite restored in an hour or two. To conclude, if you would secure a nightingale in a healthy constitution, do not fail, in the month of March, to purge him with half a dozen of black spiders, one every day.

Of the proper Food for Nightingales.

ALL meat agrees with a nightingale, provided it be mixed with flesh; without which he will not be nourished. He is naturally inclined to feed and live on spiders, wood-lice, ants eggs, flies, and worms, which agree with his constitution: this has put many upon preparing compositions proper to be substituted in the room of his natural food. The most common is an equal part of hemp-seed, crumb of bread, and minced boiled fresh beef, well mixed together; this agrees very well with them, but it is very troublesome, since it must be prepared fresh every day in the summer; wherefore make the following composition of a paste, which will keep good a long time, be liked, and agree with them.

Receipt for the Paste.

TAKE two pounds of lean beef-stakes, Spanish or chick pease, husket, millet-seeds, poppy-seeds, sweet-almonds, of each half a pound; wheat-flower, two ounces; virgin-honey a pound; saffron in powder, a drachm and a half; the yolks of twelve new-laid eggs; fresh butter, the quantity of a hen's egg.

First, let the pease and millet-seeds be powdered and sifted. The poppy-seeds must be only well bruised, because

cause their oiliness will not admit of sifting. The beef must be either finely minced, or pounded in a marble mortar, and cleared of all the fat and skin; the almonds must likewise be pounded, after blanching, in hot water; and they must be wrought to a perfect paste, otherwise the birds cannot digest them: then break the eggs, and separate the yolks into a broad clean earthen dish, and add the honey and saffron. When these three are well mixed, incorporate therewith successively the beef, almonds, meal and flour, stirring the whole with a wooden spatula till no clods remain; then turn the mixture into another glazed earthen dish, whose inside has been rubbed over with butter: set it on a gentle fire, stirring it continually, especially the bottom, to keep it from burning; continue it on the fire till the paste will no longer stick to your fingers, and has acquired the stiffness of a new-kneaded biscuit. This, done, remove it from the fire, and let it cool in the dish; afterwards put it into a tin box close covered, and keep it in a dry place for use.

The preparation is very difficult at first trial; the proper dryness therefore must be found by experience; when over-dry it loses its substance, and sheep's-heart must be often mixed with it, else the birds will grow lean: on the other hand, if it be under-dried it will turn mouldy in keeping, if you have not a good number of birds to feed; for this proportion of the ingredients is calculated at the rate of six months provision for one bird. For want of Spanish pease, maize or Turkish corn will do as well.

If, by mixing an even quantity of sheep's-heart with this paste, you regale your nightingales now and then, upon certain occasions, their song will be stronger and more lasting; and you will be recompensed for it, if you do it, all the singing-season, by their melodious harmony.

THE CANARY-BIRD.

These birds derive their name from the place whence they originally came, viz. the *Canary Islands*, which are situated in the Atalantic Ocean, over-against the empire of Morocco in Africa.

Though the ancients celebrated these places (which they termed *fortunate*) for the multitude of their birds, yet they have not mentioned any sort in particular. It is probable that the species now bred all over Europe was not introduced till after the second discovery of these islands, which was between the thirteenth and fourteenth centuries. An exact date cannot be fixed on, when first they made their appearance in this quarter. Belon is totally silent concerning them; and he wrote in 1555. Gesner is the first who mentions them; and Aldrovand speaks of them as rarities, because of the great expence of bringing them so far, and the difficulty of preserving them on their voyage. On the same spot whence they were originally imported, they are still abundant; but they are sufficiently numerous in our own country, to supply the wants of purchasers. Of late years, a sort of birds is brought from Germany, called *German-birds*, and the French breed those which we call *mealy-birds* and *mottled-birds*, which are in higher estimation than those bred in England; though all came originally from the same place. We are indebted principally to the industry of the people of Tyrol for the care taken of the breed. Some people have known these birds to live to the extent of eighteen years; though eight years is about the medium rate.

The cock birds never grow fat, and by some country people are often taken for green-birds, though they are much lustier, have a longer tail, and differ in the heaving of their throat in singing. So much esteemed are these birds for their song, that very high prices are given for the best kinds, and such as are excellent in their note.

Canary-birds are called by different names to distinguish their several ages: such about three years old are termed *runts;* those above two years are termed *eriffs;* those of the first year, under the old birds, are called *branchers;* those again that are just flown, but cannot feed themselves, *pushers;* and those brought up by hand, *nestlings.*

To possess a good bird, two requisites are absolutely indispensible, viz. sound health, and a melodious song: we shall therefore lay down a few short rules for this purpose.

How to choose a Bird in Health.

Let him be a young sprightly bird, and strait, standing with vigour, like a sparrow-hawk, not subject to be fearful, but who after flinging himself two or three times from the perch to the top of the cage, will shake himself, and undauntedly strut, as if void of all fear, appearing vigorous, sleek and strait; but to observe this well, let the bird be at a convenient distance from you, or this may be merely the effects of fear; for a bird that is inclined to be sick will appear sleek and trim, during the time of his surprize. While you are too near his cage, he may appear well, by the craft of the person who sells birds to you by his flurrying the bird in the cage with his hand, as if pointing at him to show his beauty, he will stand strait, draw up his feathers, and appear sleek, by which the purchaser is deceived, whereas, by hanging him up, or setting him at a distance, if he is not well, he will presently shew it, in crouching down, hanging his wings, appearing all of a heap, rough in his feathers, and putting his head under his wings. If a bird be in health, it may be known by his dung: when he is taken out of the store-cage, observe well if the bottom of the cage be clean, then take notice of the dung, and the manner of his dunging, for if he bolts his tail afterwards, like the nightingale, it is a sign he is not in perfect health, although he may sing for the present; but if he does not bolt, and his dung appear thick, hard, round, and of a fine white on the outside, darkish in the middle, and quickly dry, then it is a very good sign, for a seed-bird seldom dungs too hard unless he be very young. If he dung thin like water, with no thickening in it, it is a bad sign; and lastly, if he dung only a slimy whiteness, with no black in it, it is a sign that death is approaching, and that he will not continue long with you.

How to choose a Bird for Song.

HEAR him sing before you buy him, then you are sure you have not bought a hen for a cock. In the next place the song is reckoned good when it is begun something like the sky-lark, running on into the notes of the nightingale: if he begin well, and holds it long, nothing can be sweeter; but as the fancies of men are as different as the colours and songs of birds, so their ears must be the best judges of their own fancies. We shall, however, give our opinion *to those who have not had experience in this delightful* amusement.

A bird that begins with the sweet of the nightingale, and ends with the song of the tit-lark, is melodious, sprightly, and delightful to the ear.

These notes are distinguished by the sweet jugg, followed by a swell, with the water-bubble, and then the sprightly song of the tit-lark, chewing and whisking several times in a breath; a bird that will go sweetly through his song in this manner, without breaking off, may be said to be a good song bird.

Some are sufficiently pleased when a canary-bird only sings the song of the tit-lark, which is indeed very pleasant and delightful. Others fancy the bird which begins like the sky-lark, and holds on his song in the same manner; having long notes and sweet, without much variety.

If these instructions do not truly qualify a person, let him then choose what is agreeable to his own ear; and that which holds the song longest, without breaking off, without harsh scraping notes, or disagreeable whining, will probably be the bird of his choice.

How to know a Cock from a Hen.

THE most certain method is the bird's song, which, as has been observed, is a never-failing argument. Hens never sing, although some have, by a sort of jabbering noise, deceived not only unskilled persons, but those who have thought themselves complete fanciers.

To distinguish then between the cock's song, and the hen's jabbering, observe, that in the cock, let him sing ever so indifferently, almost every time he strikes a note, the passage of his throat heaves with a pulsive motion, swelling like a pair of bellows all the time he is warbling his notes: let the hen make what noise she will, and imitate singing ever so well, this motion is never to be observed in her throat.

The next observation is, the largeness, vigour, and majestic carriage of the cock, which he generally shews, if in health, by stretching his neck and head to the utmost. The hen is smaller and shorter every way, especially from the legs to the vent, which has a more sudden roundness, occasioned by her being naturally larger in that part, for containing and laying her eggs. The cock, on the contrary, appears in that part more slim and long, coming down from his legs to his vent, gradually tapering, and ending in a small point under his tail.

Further, if you blow the feathers of both, you will find the vent of the cock to appear longer than that of the hen, and the orifice not quite so wide.

Lastly, you may know the cock by the colour above the bill, which is a more bright yellow. Likewise by his throat, and the pinion of the wing; for let the birds be of whatever colour they will, they always have a little yellow almost upon their bills, and under their throats, and a stroke over the eyes, which in the cocks is a bright strong yellow, but in the hens is more languid and pale.

Of the Diseases and Cure of Canary-birds.

THESE birds are subject to many diseases, more particularly to imposthumes which affect the head, and cause them suddenly to fall down. When they are thus seized, they will soon die, if they are not speedily relieved. A medicine the most approved of is an ointment made of fresh butter and capon's grease melted together. With this, the top of the bird's head is to be anointed for two or three days, and it will generally dissolve the imposthume: but if the medicine has been too long delayed; then, after three or four times anointing, see whether the place of his head be soft; and if so, open it gently and dexterously, and let out the matter, which will be like the yolk of an egg. This being done, anoint the place with the above ointment, and the cure will be complete. At the same time he must have the pulp of figs, mixed with his ordinary food; and his drink should consist of water with a slice or two of liquorice and some white sugar-candy.

Another malady to which they are incident is a surfeit, either from their being fed by the old ones with too much greens, or from their over-gorging themselves when they come to feed on the same food; especially that sort of chick-weed which is very thick of leaves, and is rank and moist, having no seeds. This sort of chick-weed is very pernicious, both to old and young, but more especially to the young, as it causes them to swell very much under their bellies, appearing as it were transparent, full of little red veins, all their bowels sinking down to the extreme parts of their bodies, and sometimes turning black: when it comes to this, it is then very dangerous. Besides other remedies, they must be kept very *warm*.

The same, or a similar distemper comes by violent colds, but is more easily cured, *if taken in time:* it is called a swelling, and is, in the first degree, only white, which, if not prevented, turns red; it, last of all, turns to a black swelling, which is very hard to cure; few surviving the last degree of this distemper.

Moulting is natural to all birds; yet, while it lasts, it may be counted dangerous, unless proper care be taken; for we may compare the first moulting to that of children breeding their teeth, the one being equally as hazardous and mortal to birds as the other is to children. Some seasons are more favourable to moulting than others; and that is, when moulting time comes in very warm, and concludes with temperate weather. You may discover when they begin, and are in moult, by their appearing rough, melancholy, and sleepy in the day, with their heads under their wings. You will find the cage they are in, covered with down and small feathers (for the young ones cast their down and small feathers in the first year; and in the second, their tail and wing feathers.)

They sometimes grow very sick, and have a little pimple growing on their rumps, called the *pip on the tail*. The best way is to let it have its course, and break of itself; unless the bird is bad indeed, and then he must have speedy relief.

They have sometimes yellow scabs about their heads, and sometimes about their eyes: when this distemper spreads, nothing but time and cooling food will carry it off.

To order them in Moult.

WARMTH, and good nourishing food are of the most use in this distemper. For this reason let your birds be where the sun shines very strong on them; or if it does not, let your place, or cage, be kept very warm during the whole time of their moult. Let them be where no wind can come to them; for the least cold may chance to kill them. Give them Naples-biscuit, bread, and boiled chopped egg, bruised hemp-seed, lettuce-seed, and maw-seed; and in their water, put a little saffron. If the weather is very hot during the time of their moult, leave out the saffron, and instead, steep a small piece of liquorice in their water, and give them plantain and lettuce-seed together. If your bird should be very bad, let him have Naples-biscuit steeped in white wine, and force a small drop down his throat, finely tempered in your mouth; this last must not be used, unless his case be dangerous.

When your canary-bird is troubled with the little pimple on his rump, called *the pip*, and you observe tokens of sickness in him, if it be ripe and full of matter, take the point of a fine needle, and let out the matter with as much gentleness as you can; squeeze it all out, and afterwards take a bit of sugar moistened in your mouth, to put on the sore, and you will heal it.

There is sometimes on their heads a yellow kind of scurf, which, if full of matter, is covered with little scabs, as has been already observed: this must be supplied with oil of sweet almonds, sweet lard, and fresh butter as it comes out of the churn (without any salt, or the capon's grease:) anoint with any of these things, and administer the same food, as lettuce-seed, &c. &c.

Having, in some places, prescribed cooling or cleansing things, and, in others, what is warm, dry, and nourishing, we think it not amiss to be explicit on this head.

Among

Among the cooling is chick-weed; but be not over lavish in this. Plaintain, lettuce, scalded rape-seed, and a small quantity of grits with their common hard seeds, are excellent; and for their drink, water with a small bit of liquorice in it. These must be given when the spring is pretty forward, just before breeding time, or in extreme hot weather; but do not continue them above two or three days, lest you make the birds scour too much. If they should scour too much, draw some of their tail feathers: put saffron in their water, and maw-seed in the tin pan, turning the drawer you put the victuals in upside down, and covering all the top of the drawer with nothing but bruised hemp-seed. This is a sovereign remedy for a looseness; though, some will give them a head of groundsel. The most nourishing and drying food is Naples biscuit, alone, or mixed with hard egg, chopped; bruised hemp-seed, millet-seeds, maw-seeds, bread and eggs, and rape-seed, mixed together (the rape-seed being scalded, to mix the better with the bread and egg) in the same manner as directed before.

While the cold winter season lasts, let them have a sufficient quantity of these warm and nourishing things; and now and then a little saffron in their water.

Of the Breeding of Canary-birds.

CANARY-BIRDS may be bred in this kingdom; and, if treated with care, they will become as vigorous and healthful as in the country whence they originally came. They are frequently mixed in their breed, with other sorts of birds, and prove very fertile; for instance, with the goldfinch: it is remarked, however, that the breed is usually sterile. They prove also prolific with the linnet, the yellow-hammer, the chaffinch, and even the house-sparrow. The male Canary-bird will not assimilate with the female of the above-named birds; so that the hen bird must be

every

ever of the Canary species, whose young are gen'rally male birds.

These birds breed four times in a year, and commonly lay four, five or six eggs at a time: six was the greatest number of young ones ever known to be brought up at once. They sit fourteen days, including the day that you set them.

Your birds, if you do not mix the breed with other sorts of birds, must be both yellow, matched together, and stout, otherwise they will breed very small; but if your hen be yellow and small, then match her with a large *mealy-bird*, which will strengthen the breed. It is not advisable to match your birds till the middle of March: you should turn them up the latter end, which is time enough. Get, in the first place, a large convenient cage, or else prepare a room for the purpose. Let it be towards the sun-rising, because the birds love warmth; and sunshine in the room in the morning makes the room warm all the day. You may make an out-let in the window towards the sun-rising, that they may go out, and have a little air when they please. You should not overstock the room: if it is pretty large, you may turn in ten or twelve pair. Prepare your room after this manner: throw red sand, or gravel, at the bottom, and, if you please, set up a tree in the middle of the room; you may likewise nail up nest-boxes and back-cages in every corner of the room, for some birds love to build in the dark, and others in the light. You must be sure to put as many more boxes and cages as you have pairs, for they love to have a choice; and they are apt to go to nest again before the first fly. If there is not every conveniency, they too often make their nests upon the young ones. Several have lost a nest of two or three young ones, upon this very account; for when they went to look for the birds, they saw nothing but a nest, made in the same box; which puzzled them to know what was become of the birds, and pulling out the nest, nests they have found them all smothered under it. When they likewise build in the tree which is in your room, if you do not tie it in several places, the nests, eggs, and young ones will be apt to fall through: many have lost birds after this manner. In our opinion, the best way to breed them in a small way, more for amusement than profit, is in a cage made for that purpose, which ought to be as large again as common breeding cages, so that they may have room to fly; for, the more room the better. You must likewise have two boxes to make their nests in; for they are apt to go to nest again, before the young ones fly, and when there are two boxes, the hen will build in the other box, and the cock will feed the young ones.

How to order them, to build their Nest.

To make their nests, give them elk's hair and a little fine hay; some give them soft feathers; but it is better to give them nothing but a little fine hay, and elk's hair: they will use dry chick-weed, or any other thing they find at the bottom of the cage; which if they do, and afterwards line it with hair, it will do as well as the best.

Some people, however, proceed in this manner: they dry sweet hay in the sun, which they mix with dried moss and stag's hair, and tying them altogether in a little net *, they hang it up in a snug situation. This certainly is a cleanlier way; as the birds are prevented from dunging on it, or mixing it with their food.

How to feed Young Canary-birds.

If you choose to bring them up by hand, feed them with the same food as you do linnets, and take them away at twelve or fourteen days old; for if you let them lie longer with the old ones, they grow sullen, and will not feed. If you design to let the old ones bring them up; let them alone till the old ones hatch again. As soon as they have young ones, take the former away, or else they will spoil the young ones by pulling them out of their nest, or picking them as they lie. When you take them away, you must make their victuals very good. Boil an egg hard; then mix in a little of the yolk, likewise about as much of the best bread, and also a little scalded rape-seed (about a third part of the rape-seed as there is of bread). If you have but few birds, you may take a trencher and bruise the seed with the blade of a knife, and make it very fine, for the finer the better; you must likewise put a little maw-seed among it, and so mix it up altogether, and give them a pan full of it every day. You may likewise give them a little rape, and canary-seed by itself; this is the food that young canary-birds are fed with that are brought up by the old ones till they have moulted off: take particular care not to let the rape-seed be sour, for if it be, it gives them a looseness and kills them. You must likewise make your soft victuals fresh every day, or every other day at farthest.

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* Little nets, prepared as above, may be had at the shops of *Wire-workers and Cage-makers*; together with every kind of apparatus adapted to this entertaining employment.—*Ed.*

Concluding Observations.

ALWAYS put the cock and hen together in a small cage, so that they may be paired. Turn them into the room or cage which you design for their breeding. Feed them very well with soft meat, that is, boiled chopped egg, bread, maw-seed, and a little scalded rape-seed (hardly a third part of egg) mixed very well together: put scarcely one part of rape-seed to the quantity of bread and egg. Before they have young ones, give them groundsel, with seed on it; and, afterwards, chickweed, with seed upon it. Towards June give them some shepherd's purse, and in July and August plaintain. For want of these things, you may supply them with a cabbage lettuce; but this is not to be used for a constancy. Be sure you do not fail of giving them fresh greens, and soft victuals, every day, when they have young ones, (especially in the morning), for if they are neglected when young, it will be hard matter to raise them.

THE LARK.

THIS class of birds is very numerous, amounting to no fewer than twenty-eight species; but as our intention is to speak only of singing birds, we shall confine ourselves to the *sky-lark* and the *wood-lark*.

Previous to our entering upon the peculiar description of these birds, it may not be unentertaining to give a general sketch of their history. They both of them sing as they fly, raising their sweet notes whilst they soar, and charm all around them with their music; till the songsters are far removed out of the sight of their gazing admirers. At earliest dawn they begin their song, declaratory of their gratitude to the Creator; which has been so beautifully expressed in the ballad—

> "Hark! the lark at heaven-gate sings"—&c.

And Milton in his allegro expresses his sense of rural cheerfulness; exhibiting a fine picture of the regularity of his life, and the innocency of his mind, by a like idea.

> "To hear the lark begin his flight,
> And singing, startle the dull night,
> From his watch-tow'r in the skies
> Till the dappled dawn doth rise."

It continues its harmony several months, beginning early in the spring, on pairing. In the winter they assemble in vast flocks, grow very fat, and are taken in great numbers for the table. The place these birds are taken at in the greatest quantity, is the neighbourhood of Dunstable; where the season begins about the 14th of September, and ends on the 25th of February. During this space of time, it is supposed that 4000 dozen are caught, to supply the markets of London. But these numbers are far exceeded in Germany, which has caused the government to exact an excise duty upon them. Keysler relates, that this excise has sometimes produce 6000 dollars (*i. e.* about 900l. sterling,) within the year, to the city of Leipsic; where their flavour and excellence is famous all over Germany. They are taken likewise at Naumburg, Merseburg, Halle, and other parts. The principal sort of birds which are brought to our tables, are those termed the *ortolan*, or, in America, *chi-chup-pi-sue*, and, in some places, *snow-bird*, from its being caught in snowy weather, by means of springs of horse-hair strewed over with chaff.

We now proceed to speak more particularly of the manner of rearing and keeping singing larks for the cage. and first, of the

Sky-Lark.

This is a very stout bird, lavish of his song; singing eight or nine months in the year. He is a good bird, if he can be kept from hearing others; but, if not, he is a perfect mock-bird, taking what he hears, whether good or bad. Such as are brought up from the nest, which are reckoned the best, will sing well, provided there is a good song-bird to keep them company. They are very long lived, and very hardy. They have young ones about the middle, or latter end of April; and breed three or four times a year; but the bird that is hatched in April or May, is reckoned the best. They commonly breed in fields of high grass, or in the marshes. They have been also found in a wheat-field; or in peas, or oats, or upon a common, or heath, according to the season of the year.

The Mode of feeding them

TAKE them about ten or twelve days old; for, if older, they are apt to run out of their nest. They have been known to do this at ten days, in dripping weather. When you take them, put a little hay in a basket, and tie the cover close down. Having got them home, take a little white bread and milk, and boil it very stiff, till it be as thick as a poultice; likewise some rape-seed, soaked three or four hours in hot water, and either beat in a mortar, or with a glass bottle upon a table; (take about a third part of rape-seed to the white bread and milk) and feed them, once in two hours. Give about five or six bits to each bird, mixed every day with fresh victuals, or it will grow sour, and spoil. Give them also, now and then, a little flesh meat, sheep's heart, &c. You must put them in a cage, as soon as you can; but keep them three or four days in a basket, if they are young. Take a little hay, cut very short, and put it in the bottom of the cage, or else a little coarse bran; but hay is preferable, because they are apt to drop their victuals in the bottom of the cage; and, in picking it up again, they may pick some of the bran, which will do them harm. You must turn their hay up, or shift them once a day; for if you do not keep them clean, they seldom thrive. They require a large cage, about a foot square. Keep them in hay till they can feed themselves with dry meat (consisting of bread, egg, and hemp-seed), which they will do in about three weeks or a month. When you put them first in a cage, show them their victuals upon the point of a stick made for that purpose. This will make them learn to feed themselves, and likewise tame them. When they come to feed themselves upon dry meat, you must boil your egg very hard, so that you may grate it with a grater, or chop it. You must bruise your hemp-seed at first, and put about half as much hemp-seed as egg: one egg and the quantity of a roll will serve half a dozen birds.

When they are young, serve them every day; and when about a month old, put them some fine dry gravel at the bottom of the cage, with a turf of three-leafed grass. Still stick a little soft victuals at the side of the cage for fear they should pine after it; when they take to eat dry victuals, they will leave off the other of themselves. Give them a little flesh meat, and now and then, with bruised hemp-seed, till they have done moulting; then feed them only with a turf of three-leafed grass once a week, and, every other day, with bread, egg, and a little whole hemp-seed.

To know the Cock from the Hen.

SOME pretend to know him by his long claw, some by the two white feathers in the tail, and others by setting up his topple crown; but there is no certainty in these. The largest and longest birds in the nest are always found to be cocks. The best way, therefore, is to take the largest bird, and put it in a cage by itself; and if he be a cock, you will hear him record his song when he is three weeks or a month old. The hens will make some trifling noise, but not any thing of a song. Birds of a month old have been known to get into one corner of the cage, and repeat their notes over like the old one, though not so loud: these birds you may depend upon to be *cocks.*

The Pusher.

A PUSHER is a bird that is taken three or four days after he has left the nest. If you wait till he runs out, place yourself in a hedge, or in any convenient place where you may see the old one bring him meat, and when you perceive him, run upon him as fast as you can, by which means you will find the other young ones. As soon as you have got them, put hay at the bottom of the cage, and feed them with flesh meat, bread, milk, and rape-seed, as you would the nestling. This bird is esteemed as good as a nestling.

The Brancher.

THIS bird is taken in June or July with a hawk and a net, the same way as wood-larks.

A brancher is a bird full grown, but has yet his nestling feathers. They are reckoned good birds, but very inferior to a nestling or pusher. It is not so well to take them when moulting, nor after they have moulted and their feathers set: for in this case they will not moult well again, nor, in all probability prove so good.

Chuse the longest and largest bird as the cock. When you have taken them, give them bread, boiled chopped egg, and bruised hemp-seed. Put, at the bottom of the cage, red sand, and strew a little meat upon it for three or four days, and they will soon become tame and familiar.

To take the Sky-Lark in Flight.

THIS bird is taken in the same manner as other small birds, with a clap net; though in the country about Dunstable, and several other places, they are taken with the addition of a glass called a *larking-glass*. These glasses are made near the size and shape of a cucumber, hollow within, with three, four, or five holes, cut round, and pieces of looking-glaſs placed in them. It is fixed by a staff, and runs out like a whirligig, having a line leading to a distance, where some one stands at a pull pin, who works it backwards and forwards. This must be when the sun shines, as the larks will play the better for the glaſs glittering; and the birds hovering about, and seeing themselves in it, come down, when the nets are pulled over them. By this method, a great number of them may be caught at one time.

The sky-lark is likewise taken in dark nights, with a net called a trammel; which is about twenty-six or thirty yards long, and six over, run through with six ribs of packthread, placed at the ends, and put upon two poles sixteen feet long, made taper at each end. It is carried between two men, half a yard from the ground, every six or seven steps touching the ground to cause the birds to fly up otherwise you will carry the net over them, without disturbing them. When you hear them fly against the net, let it fall, and you may be sure they are safe under it. This net is of such a nature, that it catches all sorts of birds, such as partridges, quails, woodcocks, &c. It has been known to catch twenty dozen larks in one night.

The way of taking larks in a great snow, is to take one or two hundred yards of packthread, and at every six inches to fasten a noose made with horsehair (two hairs twisted together are sufficient): at every twenty yards, there must be a little stick thrust into the ground, and so on, till it is all set: some have a thousand yards. Amongst these nooses, scatter some oats, from one end to the other, and you will find the larks flock very fast; and when three or four are caught, take them out, otherwise they will make the rest shy. When you are at one end, they will be at the other, feeding, so that you need not fear frightering them away, for they are very eager at their food. After Christmas, before the snow falls, these birds seldom or never prove good for singing.

A sky-lark is a very fine, hardy, strong bird, and seldom sick, if you let him have a turf of three-leafed grass, once or twice in a week.

If you find him out of order, that is, the dung loose, grate a little Cheshire, or other cheese, in his victuals, and give him some wood-lice, three or four in a day, which is very good for him: likewise put a little liquorice, and a blade of saffron in his water, which will make him sing clear: if this will not do, give him now and then a spider. This is all that is needful for a sky-lark.

Having now set down every necessary observation for the care of this charming bird, we prosecute our intention of writing on the

Wood-Lark.

THIS is a very fine melodious bird, having a delightful variety of notes, when in good health, and by some deemed very little inferior to the nightingale. He has been known to sing against a nightingale striving to outdo him, and if not immediately removed from the place where he hung, would certainly have fallen a martyr to emulation.

This bird sings nine months in the year: he frequents, chiefly, gravelly grounds, and the sides of hills which are exposed to the sun; and, if there be any stump-oaks in these places, he always resorts to them. It is a very plentiful bird about the beginning of September or Michaelmas: he is to be taken with nets called clap-nets, such as are made use of to catch linnets, or other small birds; and those that are caught at this time of the year are reckoned the best, because keeping them all the winter, makes in the bottom of the cage, or amongst their victuals; and, instead of gravel, put mould full of ants at the bottom of the cage: this is the best live food you can give them.

If he does not sing so free or stout as you would have him, put a little stick liquorice and a blade of saffron in his water, which will clear his voice, and make his notes stronger.

To know the Cock from the Hen.

Some say they know him by the length of his heel, and also by the largeness of his wing, likewise by his setting up the crown upon his head; others say, that if he double his call two or three times, he is certainly a cock; but these are all conjectures. The surest method is, by the length of the bird, the longest being generally a cock. However, when you have taken them, single them off in cages, and if they are cock-birds, they will sing in a few weeks.

This is the best bird that is kept in a cage, except the nightingale. He has such a curious, fine, melodious song, that he will take from no other bird, unless those brought up from the nest, which may be taught with a pipe.

It is likewise a hot mettled bird, and breeds very soon in the year. If you have a mind to bring them up, you may feed them with nightingale's victuals, mixed with a little hemp-seed bruised, or a little sweet almond. Let them be very well feathered before you take them, or you will find it very difficult to bring them up. When you take them, tie down the basket, and give them four or five bits at a time, once in two hours, according as their stomachs will bear it. They are very subject to the cramp, and very hard to moult; be sure you give them plenty of nightingale's food, for that is the best to make them moult. It is not worth while to bring them up from the nest, (unless you design them for the pipe,) their own song being so very soft and melodious. There are some so tame when taken at Michaelmas-time, that they will eat victuals out of a man's fingers, and play with him as if they had been brought up from the nest.

Of the Females.

The hens couple with the males in the beginning of February, at which time, and not before, they part with the last year's brood. Immediately after coupling they betake themselves to building their nests, for which they generally prefer grounds where the grass is rank and [illegible]. The principal material they use is dry grass, and they always choose some place sheltered by a good tuft for their nest, to defend themselves from the cold winds, which are very severe at this season. They feed their young principally with a small red worm, but it is very difficult to find this kind, to feed a nest of them under your care, though they certainly would thrive better.

THE BLACK-BIRD.

When this bird has attained its full age, it is of a fine deep black, and the bill of a bright yellow, with yellow edges to the eyelids. The bill is dusky, when young, and the plumage of a rusty black, which makes it difficult to distinguish the cock from the hen. The eggs are of a bluish-green, marked with dusky irregular spots, laid in a nest formed of moss, dead grass, fibres, &c. lined with clay, and over that some hay or small straw. Few birds are of a more solitary and retired nature, frequenting the thickets and obscure corners of plantations.

This bird breeds very soon in the year: it has young ones very often at the latter end of March; and you may take them at ten or twelve days old. In the country, they commonly feed them with cheese-curd, or white bread and milk; but the best way is with sheep's or ox's heart, or any other sort of lean meat, cut very small, and mixed up with a little bread. While they are young you must make their victuals moist, and feed them once in two hours; and you must be sure to keep them very clean, and take their dung away every time you feed them: if you find their nest grows dirty, take them out and put them in clean straw. You must part them as soon as you can. When they are grown up, you may feed them with any thing of flesh meat, boiled, raw, or roasted; you may likewise bring them up to wood-lark's victuals; but flesh-meat, mixed with a little bread, is reckoned the best. This bird is a stout, strong bird, and has a very pleasing note of his own, though you may teach him to whistle tunes to a pipe. He will whistle about four or five months in the year, and is very delightful to his keeper, if well taught. If you find him out of order, give him a large spider or some wood lice; and you may likewise put a little cochineal in his water, which is very chearful and good. Give him only two or three spiders in a day, or five or six hog lice; for if you give him too many, it will take him off his other food, and do him more harm than good.

How to know a Cock from a Hen.

Some think the uppermost bird in the nest is a cock, and others the nestling; some also chuse them by their wings, others by their heads, or full eye. The best way is, to take the blackest bird in the nest, which, when you see them altogether, you may discover, for the cock will be rather blacker than the hen.

There are two sorts of black-birds, a black and a blackish grey sort; the hen of the black sort is commonly as black as the cock of the grey sort; however, the cocks of both are blacker than the hens. The blackest sort are deemed the best, and whistle the longest.

THE THRUSH, OR THROSTLE.

Of the thrush kind, there are several, viz. 1. The *missel*, called in Hampshire the *storm-cock*. 2. The *field-fare*. 3. The *red-wing*. 4. The *ring-ouzel*. 5. The *mocking-thrush*, of America. 6. The *throstle*, or common cage-thrush, which is the particular subject of this page.

Of all our singing birds, for sweetness, variety, and melody of note, none can be compared to the throstle: it continues to oblige us with his song for nearly three parts of the year. Like the missel, or storm-cock, it delivers its music from the top of some high tree; but descends to some low bush, or thicket, to build its nests, which it constructs of earth, moss, straw, and an internal plaster-work of clay. It lays five or six eggs, of a pale bluish-green colour, marked with dusky spots.

This bird breeds very soon in the year, and very often has young ones in March; they are fed with the same food as a black-bird. He is subject to the cramp, especially if kept dirty. When you find them cramped, put fern in the bottom of their cage, and feed them as they lie, and turn up the fern as often as they are fed. If you cannot get fern, put clean straw at the bottom; and by keeping them clean, they will soon come to their legs. Feed them also with better victuals, as sheep's heart and boiled egg, chopped very small. Though they have been known to be incapable of standing, for a fortnight;

yet, with care, they have been rendered very fine birds again.

The way to distinguish the Cock from the Hen.

The best way to know a cock from a hen, is when they begin to feed themselves, for then they begin to record their song. The cock will get upon his perch, and sing his notes low for some time; the hens will do it only by jerks, and make us believe they will sing, but to no purpose. If you are not satisfied which are cocks, keep them till after moulting, which is about Bartholomew-tide; for as soon as they have done moulting, the cocks will break out strong in song. They have been known to sing out like an old bird, a fortnight or three weeks before Michaelmas. They will sing in winter, as well as summer, pleasing notes, and a good song. They will learn the nightingale's or wood-lark's song, and divers others. Of these several sorts of thrushes, in my opinion, the heath thrush is the best, and comes nearest to the song of a nightingale; if they are sick, use them as you would the black-bird.

THE STARLING.

The whole plumage of this bird is of a resplendent black, with a changeable blue, purple, and copper-colour, each feather being marked with a pale yellow spot. The lesser covert feathers are edged with yellow, and slightly glossed with green. The quill-feathers and tail are dusky; the former edged with yellow on the exterior side; and the latter with a dirty white. The legs are of a reddish brown.

Hollow trees, eaves of houses, towers, ruins, cliffs, pigeon-houses, and high over-hanging rocks, are the places in which they build and breed. They lay four or five eggs, of a pale greenish ash-colour; in a nest made of straw, small fibres of roots, and the like. They assemble in large flocks in the winter season, especially in the fens of Lincolnshire, and do great damage to the reeds, by breaking them down, (for reeds are here of great value for thatching). They are partial to following cattle, for the sake of insects and worms which are likely to be found in their dung; and they have been seen feeding on dead carcasses exposed on gibbets, though probably in quest of insects. Seven or eight years, and sometimes longer, they have been kept in a domestic state. No call will decoy them, for they are even regardless of the scream of the owl. Many are enticed to build in bird-pots affixed to old walls, and thus whole roosts of them are taken.

It is said that the starling has been taught to pronounce French, Greek, Latin, German, and English. Its pliant throat is certainly capable of almost any sounds, and even whole sentences of considerable length. It distinctly sounds the letter R, and acquires a sort of warbling superior to its own wild notes. It is found in Sweden, Germany, France, Italy, Malta, the Cape of Good Hope, &c. with little variation.

If you would have very good ones, take them about double pen-feathered, that is, about ten days old: put them in a basket in some clean straw, and keep them clean and warm; talk to them what you would have them learn, every time you feed them. They often begin to talk as soon as they feed themselves, and sometimes before. You must feed them with ox's heart, or sheep's heart, chopped, as you would the black-bird. They must be fed once in two hours, with five or six pieces at a time, as big as a horsebean. When they come to feed themselves, you may bring them up to woodlark's meat; and give them a little flesh meat twice or three times a day.

Some are of opinion that they will learn better in a dark cage; but they have been also taught in an open one. Some say that you must cut their tongue, but this is without foundation, for more talk that have not been cut.

This is a very hardy bird, yet some of them are so troubled with fits, that they have fallen down, beaten themselves about the cage, and, if not taken out, would certainly have killed themselves. The best way to prevent this is, to give them now and then a spider or a meal-worm, and to put a little saffron in their water.

To know a Cock from a Hen.

Open his mouth, and look under his tongue, and you will find a black stroke, which you may perceive quite through, if it be a cock; but the hen has little or none. When they come to moult, the cock loses that black stroke: the feathers, when moulted off the breast of the cock, are very beautiful, and have several fine colours, which the hen has not.

This bird, if well taught, is of great value, having been sold for five or six guineas apiece.

THE LINNET.

The Linnet is a very elegant bird, of a greyish-brown colour, and of a fine red on the bottom of the breast, which is rather brighter in the spring. They are deservedly esteemed for their song. Different kinds of seeds are their general food, which they peel before they eat. Flax-seed, i. e. the seed of the *linum*, is their particular favorite, whence the name of *linet* or *linnet* is supposed to be derived.

This bird builds in hedges and furze-bushes on heaths. There are instances of a linnet's nest being taken in broom, and white-thorn. Their nests consist of different materials: when they build in hedges, they use the slender filaments of the roots of trees, and the down of feathers and thistles; but when they build in heaths, they use moss, principally, for the outer part, furnishing it within with such things as the place will afford, chiefly with wool and hair. These birds will have young ones three or four times a year, especially if they are taken away before they are able to leave the nests. They commonly breed in April, and their young ones are fit to be taken about the latter end of the same month. They have commonly four or five young ones. Their eggs are whitish, spotted like those of the goldfinch.

When they are intended to be taught to whistle tunes, or to imitate the notes of any other bird, they should be taken from the old one, when they are not younger than four days, or older than ten. When about the age of a week, or under, it is better, for then they have no idea of the linnet's note, and will be readily taught to modulate like any thing that is most familiar to their ears, and within the compass of their throat. It is a very docile bird, and will learn either to pipe or whistle any other bird's note. Some have attempted to teach them to speak, in the manner of the parrot, or other similar birds, and they will arrive at it, with great pains.

To distinguish the Cock from the Hen.

When you have all in the nest together, you may observe that some are the brownest upon the back, and, if you open their wings, you will find the second, third, or fourth feather white up to the quill; such birds never fail of being cocks. The hens have a little cast of white, and are a little brownish upon their backs, but not so much as a cock, for which reason, if you see the nest together, and observe them well, you will find the difference, better than can be described.

How to take Branchers.

You may go to their breeding places, or somewhere near them, where you can find a piece of turnip-seed, or a bank of wild rape-seed, or a place where the old one brings them to water; there you may lay your clap-nets, and catch both old and young; but young especially, which are best, if you have good song-birds to bring them up.

When you have got them, put them in a store cage fit for that purpose, and get some of the seed which you find them to feed upon; and likewise put into the cage a little hemp-seed, ground or bruised; set them in a window, or place where they are not disturbed, feeding them with this victuals for three or four days, then cage them up, either in back cages, or any other which you have most convenient. Feed them with rape, and a small quantity of canary-seed, with some few corns of hemp. This is to feed the nestling, brancher, or linnet, if well; but if ill, you may give them a little lettuce-seed, or beet-leaf; you may likewise put them a small matter of liquorice, or saffron in the water. You may give them a small piece of seeded chickweed, now and then; and if you find them troubled with a looseness, give them a little chalk, and a little bruised hemp-seed, with, now and then, a stalk of plantain seeded.

How to stop a Linnet, or any other Bird, and make them sing after they have moulted off.

Stopping of a bird, as it is termed, is of use to such as would give them a sweet song. A bird, before you stop him, must be a year old: you may put him in a stop about the middle of May.

The nature of a stop is, to have a case made fit for the purpose of putting in your birds. Leave the door open, till you are satisfied they have found their meat and water; then darken them, by degrees, till they are quite dark; and when you see they have found their meat and water, then cover them with a blanket, or any thick cloth that is warm, keeping them very hot. You may look at them, once in two or three days. Give them fresh water, and blow their seeds. It is best not to clean their cages 'bove once a month, as the heat of their dung may force them to moult. You should take a bit of stick, or a knife, to keep their dung down, to prevent dirtying their feathers; and then let them continue in this close stop for three months, by which time they will be moulted off. Then open them, a little and a little, by degrees. Take off the blanket first, and let them stand so three or four days; then open the door a little way, and take them out and clean their cages; after that, put them in again, with the door half open, for two or three days longer. Then take them out, and put them in a warm place, so that they come to the air by degrees. Put them a little beet-leaf, and liquorice in the water, with a blade of saffron, which are very good things when they are drawn out of a stop. After you have drawn them out of a stop, they will be inclined to sing more and more. Birds will continue in song till about Christmas, or after, by which time most young birds are come to their song.

The bird-branchers are very plentiful in June, July, and August; there are likewise flight-birds about Michaelmas. Forty or fifty dozen have been caught in one day, with clap-nets.

THE GOLDFINCH.

THE wings of this bird are variegated with black, yellow and white. The common goldfinch is a very elegantly coloured bird, and is very docile, and its notes very sweet. In the winter they feed on seeds, particularly those of the thistle; are fond of orchards, and often build in an apple-tree or pear-tree. Their nest is formed of fine moss, liverworts, &c. on the outside; and within, lined with wool and hair. The goldfinch lays five white eggs, marked with deep purple spots on the upper end. Some have supposed this bird to be the *Acanthis* of the ancients, but Pennant gives that appellation to the linnet.

There are several other species, as the Greenland goldfinch with a black spotted head, about the size of the common linnet; and the greenish yellow goldfinch, which is a most elegant bird: the forepart of its head, and the upper part of the throat, being covered with fine scarlet-coloured feathers; the top part of the head ash-coloured, and the upper part of the body a yellowish green.

If brought up from their nest they'll take their song from a wood-lark or canary-bird, or from any other bird; they are likewise a very fine bird to draw water, and open the box for their victuals. You may feed them with white bread and milk, according to the nature of the linnet, only grind a little canary-seed, and put the flour of it in the room of rape-seeds; feeding them once in an hour or two, three or four bits at a time, for their stomachs will not bear a great deal. Keep them with this sort of victuals till they are five or six weeks old; then give them a little canary-seed, and a little soft meat besides, but bring them to canary-seed alone, as soon as you can, which is the best food for this bird. Some feed them with hemp-seed, but it is apt to make them rotten, and decays their colour very much.

This bird is very merry, and has a pleasant song of his own; and were they not so plentiful, they would be more esteemed than a canary-bird. They have been sent abroad to the Canaries, and other countries, where they are more admired than canary-birds are in England.

The Manner of catching the Goldfinch.

THIS bird is caught several ways, and at different seasons of the year: they are so familiar, that in a fortnight after they are taken they'll begin to sing. Young ones (which are called grey-pates) are caught in June, July, and August; but the best time for catching them is about Michaelmas. They are most commonly taken with clap-nets, as linnets, in thistley fields, where they are generally found in flocks; for the seed of thistles is what they feed upon, most part of the winter. They are tender in the summer; but hardy, if taken in the winter; and will sing presently. They are fond of hemp-seed, and are generally fed with it at first, but should be taken from it as soon as possible. They will sing very stout with hemp-seed, but seldom live very long, or moult well: if you bring them up to canary-seed, they are more likely to answer your expectation.

The Manner of Curing them when Sick.

GIVE them a little groundsel every day, and a blade of saffron in their water: if they are loose, give them a little chalk, sticking it in the side of the cage, or crumbling it at the bottom. Give them always red sand, or gravel, at the bottom of the cage, for seeds being oily, this qualifies and takes the oil off their stomachs. You may likewise give them a little lettuce-seed, or seed which you may find in the great thistle.

To know a Cock from a Hen.

You may distinguish them either old or young by the blackness of the wings; the edges of the cock's being black up to the shoulder, and of a fine gloss; they are also black over the bill, and under it red: the yellow and red, and all their colours are brighter than the hen's. She has a little colour on the wing, but it is grey on the cock's; they are also grey over the bill, where the other is black. You may stop these birds as you would linnets.

THE BULLFINCH.

This fine bird may be taught to pipe almost any tune at command; and also to talk. When they have once got a tune, they seldom forget it, not even if they hang amongst other birds. They are very valuable, if well brought up; and are sometimes sold for nine or ten guineas a-piece.

It is a very pernicious bird in gardens or orchards, for they feed on the young buds of trees in spring, which contain the blossoms for the summer fruit. The black-thorn, or sloe-tree, is the great favourite of the bullfinch, and keeps him employed in the hedges in mild weather; but, if the latter end of the winter hath been severe, and these shrubs are backward with their buds in February, he then comes into the garden, the trees growing there being forwarder than those in the field in a cold spring. They will sometimes come in such numbers as to take off all the buds, from the currants, plumbs, &c. in the gardens of a whole town, in a few days.

To find their Nests.

THESE birds have no young ones till the latter end of May, or beginning of June. They commonly build in an orchard or wood, making but an indifferent nest, and having young ones, two or three times in a summer, and four or five each time. They are not very plentiful in England, for the gardeners destroy all they can; and in some parts of this kingdom, the churchwardens give two-pence for every bullfinch that is killed, to those who choose to demand it. In some countries they are called noops, thick-bills, and hoops, from their own notes, because naturally they have a hooping sort of a note.

How to feed them.

YOU may feed them and bring them up the same way as you would a linnet; only, when they feed themselves, give them more canary-seed than a linnet. Generally give them the better half canary-seed, and the rest rape. If you find them out of order, give them a little fine hemp-seed, and a little saffron in the water; give them likewise a little wood-lark's victuals, the same as you give linnets. Take them, when about twelve or fourteen days old. When kept four or five days, or a week, you may begin to pipe, whistle, or talk to them what you have a mind they should learn: they are birds that soon learn. They are remarkable for imitating wind music, particularly the flagelet.

To know a Cock from a Hen.

THERE are several opinions; some say by the whiteness of their rump; others by the blueness of their back, and others by a cast of reddish feathers under the wing.

The way we recommend, is to pull about half a dozen feathers off their breast when they are about three weeks old; then in about ten or twelve days after, you will perceive the feathers to come, where you have pulled, of a brightish red.

BIRD-CATCHING.

To render the preceding pages on singing-birds somewhat more complete, we shall subjoin a brief account of the modes in which these birds are usually taken.

Bird-catching is performed by bird-lime, nets and traps.

Bird-lime

Is a viscid substance, prepared in different ways. The ordinary bird-lime is made from the bark of the holly, boiled for the space of ten or twelve hours; when the green coat, being separated from the other, is covered up and set in a moist place for a fortnight. It is, after this, pounded into a tough paste, so that no fibres of the wood are discernable; then washed in a running stream, till no motes appear; then skimmed as often as any thing arises, and, finally, laid up for use. When it is used, a third part of nut-oil, or thin grease, must be incorporated with it, over the fire.

The juice of holly-bark is a very peculiar substance, but, if trials were properly made, it is highly probable that other juices might be found, of an equally clammy nature. The misseltoe affords a juice superior in viscosity to the holly; and if a young shoot of the common alder be cut through, there will be a stringy juice follow the knife, drawing out into threads like bird-lime. In this wood it seems to lie in the veins within the circles of the heart rather than in the bark. Hyacinths also afford a tough stringy juice within their roots; and so do the narcissus, the asphodel, and the black briony.

When twigs, &c. are smeared with bird-lime, and put in places subject to wet, the common bird-lime is apt to have its force soon taken away. It is necessary, therefore, to have recourse to a particular sort, which, from its property of bearing water without being hurt, is termed *water bird-lime*.

Preparation of Water Bird-lime.

TAKE a pound of strong and good ordinary bird-lime, wash it thoroughly in spring-water till the hardness is all removed; then beat it well, that the water may be clean separated, so as not a drop may remain; then dry it well, and put it into an earthen pipkin, and add to it as much capon's grease as will make it run. In this state of the preparation, add to it two spoonfuls of strong vinegar, one spoonful of oil, and a small quantity of Venice turpentine. Let the whole boil gently for some minutes over a moderate fire, stirring it all the while. Then take it off; and when there is occasion to use it, warm it, and cover the twigs well with it. This is the best bird-lime for snipes, or such birds as frequent wet places.

A successful method of using the common bird-lime is this: cut down the main branch or bough of any bushy tree whose twigs are thick, straight, long, and smooth, without any knots or prickles. The willow and the birch are the best for this purpose. Let all the superfluous shoots be trimmed off, and the twigs be made neat and clean: cover them all well with the bird-lime, within four inches of the bottom; but the main staff, from which they grow must be left untouched with the lime. No part of the bark where the lime should come, should be left bare; but if it be too thickly laid on, it will give the birds a distaste, and, on the contrary, to use it too sparingly, would let the birds escape, so that it is a matter of nicety to apply it properly. When the bush has been properly prepared, set it up in some dead hedge, or among some bushes near the skirts of a town, or farm-yard, for these are the principal resorts of small birds, in the cold weather. In the summer, a quick-set hedge, or grove, or white-thorn bush near fields of corn, hemp, flax, and the like, are more frequented. Let the sportsman imitate the chirp of such birds as he sees around the spot, or use a bird-call, which may be purchased for the purpose. On a bird being held fast, let it patiently abide, and intice more to the bush; for the fluttering will give an air of gaiety, and deceive the others. The time for this sport is from sun-rise to ten o'clock; and from one, to sun-set.

Another method is by means of *a stale*, as it is termed. A bat makes a good stale, but it must be fastened so as to be in sight at a distance. An owl is a still better stale, for this bird never goes abroad but it is followed by all small birds in the neighbourhood. They will gather together in great numbers about it; and, having no convenient place to sit on but the limed bush, will be taken in vast numbers. If a live owl or bat is not conveniently to be had, you may use a stuffed one, which will serve the purpose, and last twenty years. Some have used the image of an owl, carved in wood, and painted of the natural colours; and it has been found to succeed tolerably well.

We shall not enter into the merits of the different methods of catching birds with nets and traps, as many seedsman and net-makers in London furnish the former, and all the cage-makers and wire-workers make the latter. There is indeed a trap sold by the basket-makers, which is a large species of mouse-trap, where the animal can readily enter, but is effectually prevented from returning: these are intended for catching the common house-sparrows, which make a good ordinary farmer's pudding.

Preserving Dead Birds in their Plumage.

Whenever we have the misfortune of losing a favorite singing-bird, or we wish to preserve the remains of some curious creature which we may have met with, it is useful to know how, and in what manner, their bodies may be preserved, so as to keep off putrefaction, and retain their plumage in all the beauty of their colours.

After opening the bird, by a longitudinal incision from the breast to the vent; dissect the fleshy parts from the bones, and remove the entrails, eyes, brains and tongue. The brains may be readily taken out at the eyes, by a surgeon's instrument called a *fine director*. The cavities and inside of the skin are to be sprinkled with the powders to be hereafter mentioned; and the eyes, made purposely of enamelled glass by persons who make it their livelihood, are to be fastened into the sockets. Cotton or tow is now to be stuffed into the head; and a wire is to be passed down the throat, through one of the nostrils, and fixed into the breast bone: wires are also to be introduced through the feet, up the legs and thighs, and inserted into the same bone. Next of all, the body is to be filled with cotton, and the skin to be carefully sewed together, keeping the natural size of the bird. The attitude is finally to be attended to, and the body is to be gradually dried; after which process it will remain stiff in the position in which it was placed.

Receipt for the Drying Compound Powders.

Corrosive Sublimate, *i. e.* Muriate of Mercury . .	quarter of a pound.
Saltpetre or Nitre, prepared, or deflagrated	half a pound.
Alum, burnt	quarter of a pound.

Flowers,

Flowers of Sulphur . . .	half a pound.
Camphor	quarter of a pound.
Black pepper	one pound.
Tobacco, coarsely ground . .	one pound.

Mix the whole together, and keep it in a glass vessel closely stopped.

When a subject is to be kept in a hot climate, or in sultry hot weather, and sent to a distance to be afterwards duly prepared by the operator *, it should be secured in a box filled with tow, oakum, or tobacco, and well sprinkled with the above compound.

Small birds may be preserved in brandy, rum, and arrack; though in this manner the colour of the plumage is liable to be extracted by the spirit. Large birds, such as sea-fowls, have thick skins, which will allow of their being flayed off; therefore the claws, head, feet, and some few other parts, will alone remain to be preserved after the manner above: the inside of the skin may be stuffed with tow or cotton.

Kuckahn observes, that "Baking is not only useful in "fresh preservations, but will also be of very great ser-"vice to old ones, destroying the eggs of insects; and it "should be a constant practice once in two or three years "to bake them over again, and to have the cases fresh "washed with camphorated spirits, which would not only "preserve collections from decay much longer, but also "keep them sweet."

The baking here mentioned is to be conducted very slowly, in a low stifling heat, such as remains in the oven after the bread has been removed out of it. Baking is said to shrivel and injure the plumage, unless great care is used, therefore it may be proper to try the heat, previ-

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* An ingenious man, named Hall, formerly in the watch-making line, professes this art, at Finsbury Terrace, Finsbury Square, London.—*Ed.*

ously, by means of a feather, before the subjects are committed to the oven.

Mr. Bancroft, in his "Natural History of Guiana," gives an account of the method practised by the people of that colony, of preserving a variety of beautiful birds for the cabinets of naturalists in Europe. "They put the "bird which is to be preserved into a proper vessel, and "cover it with high strong wines, or the first running of "the distillation of rum. In this spirit it is suffered to "remain for twenty-four or forty-eight hours, or longer, "according to the size, till it has penetrated every part "of the body. When this is done, the bird is taken "out; and his feathers, which are no ways changed by "this immersion, are placed smooth and regular. It is "then put into a machine, made for the purpose, among "a number of others, and its head, feet, wings, tail, &c. "are placed exactly agreeable to life. In this position "they are all placed in an oven, very moderately heated, "where they are slowly dried; and will ever after retain "their natural position, without danger of putrefaction."

PART XIII.

A COLLECTION OF *RECEIPTS OF VARIOUS KINDS.*

How to make Black Soap.

TAKE thirty pounds of unslacked lime, in whole pieces, and ninety pounds of good and strong pot-ash. Make a border with the pot-ash round the lime, in the manner bricklayers do their mortar, and, with a new broom dipped in water, sprinkle the lime by little and little, that the lime may be heated; and when it is well mollified, let one with a spade mix the lime with the ashes, whilst another sprinkles it with water, round about, till you perceive no dust, and you cannot distinguish the ashes from the lime. Being thus well mixed and incorporated, close it up with your spade in a heap, and so let it lie for three or four hours, in which time it will heat and work; when you find it makes chinks and clefts, it is a sign that it is risen. If it be in the winter-season, then cover it, lest the cold should chill it, and prevent its working. This done, put the said matter in a vessel of earth, having a hole near the bottom, which you cover with a little straw, and a dish over it, that the matter may run leisurely. When you put in your mixture, press it equally down every where, as much as you can, so as to lie smooth on the surface; then make ready six or eight pails full of strained lye, and pour on it two or three pails full, which being sunk and soaked in, put in as much more; but open not the hole at the bottom till all the lye is drunk up: then let it run out into another vessel, and having a new-laid egg tied to a thread, try whether the running-out liquid will bear it up from sinking; if you find it does, then put by that soap-lye or liquid, as the first and strongest; and pouring on more of the lye, the second running will be weaker, and the third and fourth of less strength. Put all these several sorts each by themselves, and cover them close, to prevent their evaporating; thus you may keep them good for a twelve-month together. Then take thirty pounds of the first, and ten of the second running, and put them together, trying whether it will bear the egg; and if it does, you may put a little more of the second; but if it sinks to the bottom, put more of the first running, till it sinks but a little, just to cover it. Now, to every three pounds of the said lye, you take one pound of oil, and stir it well together with a stick; having thus mixed the oil and soap-lye together, leave it to infuse till the next day, and then boil it in a copper for seven or eight hours, according to the quantity, either for a longer or shorter time: keep it stirring all the while, till it begins to boil slowly. Do not fill your copper too full, lest it should boil over. When it has boiled for eight or nine hours, then let it cool; but first, when in the boiling you observe it to rise in bubbles, take a little of it with a spoon, and put it in an earthen dish to cool; then cut it with a little stick, and if it close together again, it is boiled enough;

but if not, you boil it somewhat longer, till it answers your expectation; then take it off the fire, or take the fire from under the copper. If your oil is sweet and clear, the soap will be good; but if the oil be foul, stinking, and thick, your soap will be of the same quality.

Another way to try whether your soap be boiled enough is this: take some of it out of the copper with a wooden spoon, and it will draw in ropes or threads; if they break and shrink up, it is a sign of not being boiled enough; but if they do not shrink, you may conclude it wants no more boiling. By taking up a little, and setting it to cool, you may likewise try whether it is sufficiently boiled, by cutting it; if it stands firm and upright it is enough; but if it spreads, it wants more boiling. If, after some more boiling, you cannot bring it to its right substance, add to it a little more of the first soap-lye, according to the quantity in the copper, by little and little, keeping it continually stirring, to incorporate and mix with the rest; and thus let it boil for an hour and an half, before you make another trial; and if you find it is not yet come to its proper substance, add a little more of the first lye, boiling it as before, till you find it has a body or substance required; that is, neither too hard nor too soft.

It is a thing of great consequence to know when the soap has boiled to its right qualification: for discovering of this, some, whilst it is boiling, take a little on the tip of their finger, and taste it; if it be too strong, it will burn on the tongue like fire; but if it is of a moderate heat, so that your tongue will bear it, it is right: if it tastes insipid, you must add more of the first lye; but if too hot and strong, more of the third and fourth sort, to weaken it. When it is almost boiled enough, and of the substance of a jelly, and yet without a white colour, it is a sign of its being too strong, wherefore you must weaken it a little with the fourth lye; but when you find it to become in the boiling very white, then give it a little oil, and it will come to its right colour. If the ordinary time of boiling is past, and you find it is neither white or strong, give it more of the first lye; and thus, by adding more or less of the one or the other, you must bring it to its proper strength and substance; and he that shall have but little experience in the boiling of soap, will soon know how to manage his matters, and how to apply either oil, lye, or any thing else, to bring about his purpose.

To make White Soap.

WHEN you intend to make white soap, you must keep to the same ways and means as directed before; and when it is above half boiled, put into it some salt, according to the measure and quantity, and let it boil a little; then take it out of that copper, and put it into another; and when it begins to boil, put into it more salt, keeping it boiling to its full time. Being sufficiently boiled, pour it on an even or flat mould; and when dry, cut it into square pieces, and it will be fit for use.

Note. Put in one part of salt to ten parts of soap.

To make Soap with sweet-scented Oils, or Flowers.

TAKE of the above made soap, before you put it to dry, and boil it up again with rose-water, and a little oil of Benjamin, or any other odoriferous oil, according to the quantity of your soap, neither too much nor too little, and then let it cool and dry, in the manner as directed above. You may also take fresh rose-leaves, well stamped in a stone mortar, and incorporate them with the said soap: the same you may do with any other odoriferous herb or flower you have a mind.

To make sweet-scented Wash-balls.

Take of the whitest new Castile soap, as much as you think proper; scrape or grate it, and then temper it with rose-water: thus set it for eight days in the sun; then add to it a few grains of musk, and, by stirring it about, reduce it to a thick paste, of which you may form excellent wash-balls.

Another Method to make Wash-balls.

Take a pound of the best soap you can get, and, after you have grated or scraped it very small, take fine cinnamon, nutmegs, storax, one ounce of each; wood of aloes, two drachms; Benjamin, two ounces; powder of violets, one ounce: all these things being beat to a fine powder, add one drachm of the powder of cypress, and a little musk and civet. Steep and temper them with rose-water, and set the mass in the sun for forty days successively, stirring it frequently every day: after which, make wash-balls of it, and, when dry, lay them in boxes or glasses between cotton or wool.

Another.

Take old white Castile soap, cut or scraped with a knife, and set it for three or four days in the sun; after which, stamp it well in a marble mortar: dilute it with rose-water, and then put it in a glazed pipkin over a slow fire, adding to it, if you will, a little civet, or other odoriferous liquid, or else drugs finely powdered. Stir it well together whilst it is boiling; and when it is of a proper consistence, take it off the fire, let it cool, and form your wash-balls of what size you please.

An excellent Powder to scour the Teeth.

TAKE of the finest and whitest pumice-stone; beat it in a mortar to an impalpable powder: this thing alone scours, and makes the teeth clean, and polishes them. You may give it an agreeable smell, by laying it among bags of musk or amber; it will attract their odour, and be a thing of high esteem.

Another Powder to whiten the Teeth.

TAKE pearls, either whole or broken in a mortar; put them into a glass tea-cup, or china bason; then take the juice of lemons or Seville oranges, strained three or four times through a linen cloth, and pour it upon the pearls, so as to cover them three or four fingers high, and you will, in a short space, perceive them to begin to boil. Cover your cup or glass, with a paper or a linen cloth, and leave it for three or four days, when you will find the pearls all dissolved, and turned into a paste as white as snow. You will discover a little yellow skin on the surface; take some clean spring water, and pour it upon the paste, and, with a clean wooden spatula, stir it about, and let it stand to settle, then pour off the water, and if still you observe any yellow remain upon the paste, wash it again as before; cover it with paper, and set it to dry in the sun.

You then take three parts of the said paste, which now is reduced to a white powder; four parts of white pumice-stone, finely powdered; one part of roach-alum, well burned; one part of white coral; the same quantity of very white alabaster. Break and grind all together on a marble slab, and you will have an excellent article to make your teeth as white as snow. If you will have it in a conserve, mix it with syrup of roses, or any other you like best; and if you will make the powder of a very red colour, mix it with lake and a little red coral. You may give it what odour you please, by mixing it with musk, amber, or any other thing.

A Powder to clean and whiten the Teeth.

TAKE coral, yellow amber, bole armenic, parched barley, or burned crusts of bread; or, in case you will have it of a cheaper kind, and make a large quantity, take bole armenic powdered, and a small quantity of white salt. If you choose to make it in a conserve, then mix either of those powders with honey, and therewith rub your teeth with your finger, and wash your mouth well after it.

A distilled Water, to make the Teeth White.

TAKE one pound of the first water distilled from honey, which is white, and put it into a phial, together with one ounce of white salt, half a pound of roach-alum, one ounce of nitre, half a pound of distilled rose-water, two ounces of mastic, half a glass of vinegar and white wine, distil all over a moderate fire, or in *balneo mariæ*. To the distilled water, put a little honey, some powder of cinnamon, a little lignum aloes, and bole armenic, to give it a red colour, as likewise strength and odour. Let this liquid stand in the sun to settle; then pour it off, and put it up for use. When you have occasion to make use of it, wash your mouth first, and wipe your teeth with a linen rag; then rub them well, with a cloth dipped in the said liquid. If your teeth are loose, you will find them fasten immediately, be comfortable, and look fair and white.

To keep the Face without Wrinkles.

TAKE an iron frying-pan, and set it on the fire; when it is very hot, sprinkle it with good white wine, and fume your face over the smoke; then wipe it with a clean linen cloth. This done, set the pan on the fire again with a little myrrh, and with that fume your face as you did before. Whilst you do it, cover yourself so as the steam or smoke may not be dispersed from you. After you have done this, you tie up your face with some linen cloths, and so go to bed. This you repeat once in fifteen days.

For a naturally Red Face.

TAKE four ounces of the kernels of peaches, two ounces of the seeds of gourds, to make an oil, wherewith anoint the face morning and evening. This will kill and destroy the redness. A thing found true by experience.

To make the Face Fair.

TAKE the fresh blossoms of beans, and distil them: with the distilled water wash your face, and it will become fair.

Another Way.

TAKE the flowers of rosemary, and boil them in white wine: wash your face with it, and also drink some of it, and it will cause your complexion to be fair, and your breath to be sweet.

To take a Tetter, or Ringworm, off the Face.

TAKE the roots of wild, or garden-sorrel, and wash and clean them well: bruise them in a stone mortar, and then steep them in strong white wine vinegar, for two days and two nights. After which you may use it, by rubbing the place three or four times a day with it, and at night before you go to bed, leaving the roots always in the vinegar, whilst it lasts. This has proved an effectual remedy.

Another, for the Same.

Take white wine lees, and set it in some corner of your house, upon the pavement, and there let it dry, then burn it in a pipkin, or crucible, to a powder; this done, put it in a sort of jelly-bag in some moist place, so as not to touch the wall, and underneath it set a cup or glass, to receive the oil that will come out of it within twenty or thirty days, and keep it in some phials *as a precious thing* *. With this anoint your spots and marks, or ring-worms, and they will vanish away in a short time, and your flesh and skin will become smooth and soft.

To make the Hair Black.

Take common lye, and boil in it a handful of beet-leaves, three or four handfuls of sage-leaves, either green or dry, as much myrrh as you think sufficient, and a few leaves of the walnut-tree, or the outward shell of the walnut. When you use it, take care it touch not your face, lest it become black also; though this lye will not so soon dye the skin, as it will the hair. After having wetted your hair, wash your face with clear water.

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* This is *Oleum Tartari per deliquium*, which is now called *Aqua Kali*, and may be had at a chemist's shop. Lower it with a little water.—*Ed.*

An Ointment to remove the Hair from the Body.

TAKE the whites of three new-laid eggs (well beaten) eight ounces of quick-lime, and an ounce of orpiment, in powder; put so much among the eggs as to make a thin paste, then anoint the place which you intend to clear from hair, leaving it on for a quarter of an hour, or some time longer; then wash it with warm water, and the hair will fall off. Anoint the place with oil of roses, afterwards.

To make Oil of Roses, and of other Odoriferous Herbs.

TAKE a thin glass, or phial, and fill it three parts full of clear sweet-oil of olives, and as many rose-leaves (or any other herb you intend to make your oil of) as will mix with the oil and will fill your phial; having close covered it, set it for three or four days in the sun; then take out all the rose-leaves, or herbs, and strain the oil from them, through a cloth, and having added more fresh leaves to the oil, set it again in the sun for three or four days, and proceed as before: repeating it thus three, four, or six times. you will have an excellent oil, of as sweet and delightful a smell as roses when fresh gathered.

Oil of Benjamin.

PUT of benjamin as much as you please, in a glass phial, close it up, and set it in a dung-hill for the space of fifteen or twenty days; after which time you may take it up, and strain it through a cloth, and put it up in another clean phial, well closed for your use. It is a choice and singular oil.

A Secret for Travellers.

LET such as are obliged to travel, especially in the summer season, carry in their pockets a piece of roach-alum, and, when dry and hot, let them hold it for a small time in their mouth; it will not only quench their thirst, but cool and refresh them on their journey.

Another.

TAKE any quantity of nitre, and the eighth part of that quantity of flowers of sulphur; melt them together, and then cast it into bullet-moulds, and it will be a stone,* answering in every respect the above purpose.

Some mountebanks esteem it much, and call it a celestial or miraculous stone, and by adding of certain colours they make some red, some blue, and some straw-colour, and attribute divers virtues to it, as for curing the web in the eye, for inflammations of the mouth and gums, and for curing the tooth-ach.

To make portable Vinegar.

TAKE green grapes, and stamp them, and put some vinegar to them, making it into a sort of paste or dough, whereof you form little loaves, and lay them in the sun to dry. When they are thoroughly dry, put them up for use. You steep these little loaves in as much wine as you think sufficient for present use, and you have a very good strong vinegar.

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* The above preparation is the common Sal Prunellæ of the shops; a small portion of this will, therefore, answer the purpose.—*Ed.*

To bring dyed Cloth to its colour again.

TAKE a pound of broken earthen-ware that is not glazed; stamp it to powder, and pour on it about two quarts of water; let it stand over night, and the next morning pour off the lye, and put to it two ox galls, and a handful of dry birch leaves; let them boil together for the space of an hour, until the leaves sink to the bottom; then let it cool. For the colour you intend to restore, take the shearings of the cloth of the same colour, and boil them with the said lye, leaving it so for the space of fourteen days or more (for the lye will extract the colour from the shearings); with it wash your cloth, and it shall revive its first colour.

To take Black Ink out of Woollen and Linen Cloth.

TAKE green lemons, or oranges; squeeze out the juice, and with it rub the spots; when dry, wash them with lukewarm water: if the first time does not succeed, repeat it again the second time, as you did before, and the spots will be gone.

To take Spots of Oil from Paper or Parchment.

TAKE trotter-bones; calcine and beat them to a fine powder, wherewith rub the spots on both sides; clap the parchment between two boards over night, and the next day the spots will be vanished.

To make Flax as soft as Silk.

TAKE what quantity of flax you please, but let it be of the best and cleanest, prepared ready for spinning; then take fresh calf's dung, as much as will inclose that quantity of flax you intend to soften: let it lie, thus covered, for five or six hours, to be soaked; then wash it clean, and it will be as soft as silk, and be fit to be spun to the finest thread.

To keep Oil sweet, and from growing mouldy.

Add to every pound of oil, two grains of common salt, one grain of the filings of copper or brass, and two grains of roach-alum, and warm it a little in balneo mariæ; then strain it out, and let it stand eight days in the sun; then you may keep such oil as long as you will; it will never diminish, putrify, nor corrupt.

To make Starch of Potatoes.

TAKE potatoes, and wash them very well in clean water, so that not the least earth or dirt may be left upon them; pare them with a knife, as lightly and nicely as possible, so that too much of the substance may not be taken away, nor yet the least skin remain (or you may scrape them as they do carrots and other roots); then take several earthen pans, half filled with pure water, also a tin grater, as fine as those used for grating sugar; rest your grater upon the bottom of the earthen pan in the water, and thereon grate your potatoes, moistening them from time to time, and taking care not to press the potatoes too hard upon the grater. The grated potatoes will sink to the bottom. When your pans are all filled, let them stand till they be well settled; then pour off the water, by inclining them very gently, lest the finest part of the substance should run off along with the water. The grated potatoes may then be put into fewer pans, each being filled within four or five fingers' breadth of the top, and then filled up with pure water. Let the matter be well stirred about and washed, and when it has stood to settle, let the pan be inclined, and the water poured off as before. These lotions with fresh clear water must be several times repeated, till at length you will see the grated potatoes become as white as snow, and incomparably fine and small, and not run into little lumps and masses, like the common starch: these are the signs of its being sufficiently washed, and ready to be set out to dry in the sun. Those who once try this sort of starch will never make use of any other. It makes the linen very clear, and surprizingly beautiful; but when linen starched with this starch is ironed, it will be proper to rub the smoothing-box or iron with a little wax, and then to wipe it with a clean linen cloth; a precaution to which laundresses are strangers.

To Clear-starch Point and Flanders Lace.

CAUSE a deal board that is free from knots to be planed very smooth and even on both sides, (two yards long). Sew a white linen cloth over it, on which tack your point lace very even and tight; this being done, sew a covering over it of canvas, fastening it on the edges to the linen cloth; then soap the canvas all over with Newcastle soap, and rub it with a brush till the suds come clear; rince it well with a spunge and clear water, and when the water comes off clear, soak up the moisture from the canvas, with the spunge. With some white starch, of a moderate thickness, starch it all over with the spunge, then wipe off with the spunge the loose starch, and set it to dry. When it is thoroughly dry, rip off the canvas, and roll up wrinkles of paper, jagged at the ends with the points of your scissars, like little brushes, and rub the points or lace all over with these; after which, you may take it off the board, and make it up for use.

To take Spots out of Cloth.

TAKE six ox galls, and double the quantity of rain water, half a pound of tartar, one ounce of alum; stamp them small, and add a glass full of vinegar, and six drachms of brayed vitriol; put all these things together, and boil them until diminished to two thirds; then strain through a linen cloth. With this lye, rub the spots till they be out; then wash the place with clean water.

To make a good Lute.

LUTE is a mortar or clay to cover over chemical apparatus that are much exposed to the fire, in order to keep them from breaking or cracking; it is prepared in the following manner: take of the best potter's earth, and put it into an earthen pan, and mix it with fine fresh cow-dung, till it becomes a smooth paste, of a good substance: to have it more perfect, add to it some salt, stirring it well together.

Another Lute.

TAKE of potter's earth two parts, horse dung one part, a little brick dust, and filings of iron, also some quick-lime; mix all together with salt water, and yolks of eggs, and work it into a paste.

Another.

TAKE dry clay, beat it to a powder, and mix it with the same quantity of wheat flour; and with a proper quantity of yolks of eggs and vinegar, work it into a paste, wherewith you may plaster or lute glasses, pots, and such like: let them dry in the shade, and they will stand the fire without breaking or cracking. Some make use of ox's blood instead of vinegar.

How to make Carmine.

TAKE four or five gallons of clear water, and dissolve therein pot-ash enough to make a strong lye, which purify by filtering; boil therein, in a brass pan, a pound of clean shreds of scarlet cloth dyed in grain, till it has quite lost its colour; then squeeze the shreds, and pass all the lye through a flannel bag. Dissolve two pounds of alum in a proper quantity of water, and add this solution to the lye; stir them well together, and the whole will grow somewhat thick; then repass it through a fine linen bag, and the liquor will run out clear; but if it be at all tinged, boil it again with the addition of a little dissolved alum, pass it again, and all the carmine will be left in the bag. Pour fresh water, repeatedly, into the bag, till all the alum be washed clean away, and the water is tasteless. Then dry the colour, so as no dust may settle upon it, and keep it for use, having first reduced it to an impalpable powder in a glass or marble mortar. If in the boiling you find so much of the water evaporated as to require a supply, you must not add cold, but boiling, water.

To gild Iron.

IT is a thing certain that gold laid on white iron or silver, shews not so fair as upon brass; for as soon as it begins to wear, one may perceive the whiteness of the iron, or the silver. Wherefore many practitioners, when they go about gilding of wood, or other things, lay the ground with a yellow colour, that it may appear better, when it becomes to be a little worn, than it doth upon a red or white. But as this colour cannot be laid on silver or iron, you must proceed in the following manner;

Take verditer or Spanish green, vitriol, and sal ammoniac, at your own discretion, the vitriol being the larger quantity: beat theſe ingredients into a powder; mix it with vinegar that is very sour and strong, and boil it for half an hour. When you have taken it off the fire, and it is still boiling, put in your iron that you intend to gild, and cover the pot close, with a cloth over it, to let it have as little vent as possible; let it stand and cool, and your iron will be coloured like brass, which you may gild with quicksilver, as is commonly practised in gilding of brass. This is a secret that few people are acquainted with. The manner of gilding with quicksilver, you will find in the first volume.

An Hygroscope.

A, B, *plate* XXII. *fig.* 2, is a whip-cord, about four feet long, tied fast to the end of the hook A; at the end of the whip-cord hangs the weight B, of about a pound, or something more; this weight is fitted at the end so as to receive and carry the index D; under theſe is placed a graduated circle on the board E, F, fixed by a bracket against the wall. When all things are thus fitted, the moisture of the air twists the rope, and gives a motion to the index over the divisions in the graduated circle; and again, as the air grows clear, the cord untwists, and brings back, or reduces the index, by a contrary motion.

To make an experiment of this, Mr. Molyneux wetted a cord, and hung it up with the weight at the end of it, and he perceived, that, as it dried, it untwisted, and that too very quickly, so as to be perceived by the eye; after the cord had so far untwisted as to come to that degree of dryness, as the then constitution of the air would permit, he took a bason of warm water, which emitted a fume and steam, and placed it under the cord; immediately the cord began to twist again very quick, and so continued till the water ceased its steam, or was removed, and then immediately it began to untwist; he then gently breathed upon it, and he found, according to his expectation, that eight or ten breathings would twist it five degrees of a circle. After this he exposed it to the air only, and he found it to obey the alterations very nicely; not the least shower falling but it presently twisted; and when a fair day became overcast, the cord was immediately sensible thereof, and as sensible of the vanishing, and of the change to fair sunshine; so that it seems to be the nicest hygroscope hitherto used. One of the grand defects of most hygrometers is, that they grow weak with age, and do not so nicely obey the alterations of the air, when long kept, as when first made. But whether the present invention be subject to the same fault, time can only determine.

To gild Parchment, or Leather, for Hangings, &c.

TAKE three pounds of linseed oil, Greek pitch, and varnish, of each one pound, and half an ounce of saffron-powder; boil them together in an earthen glazed pipkin, till by putting into it a hen's feather, and taking it out, it seems scorched: then take it off the fire, adding to it, by little and little, one pound of hepatic aloes, powdered, stirring it all the while with a strong stick, to keep it from running over; but if by this means you cannot keep it down, take it off the fire, and, having stood for a little while, to settle, put it on the fire again, to make it boil afresh, stirring it all the while gently; when all is well incorporated, take it from the fire, and, after a little while, strain it through a linen cloth into the vessel you intend to keep it in. If, instead of saffron, you put to it some of the yellow seed that is on the inside of lilies, it will be much brighter. When you gild your leather or parchment, first lay on it a ground of white of eggs, or gum, on which lay your silver or tin leaves; when it is thoroughly dry, you may lay on the above varnish, hot, and your silver will change into a bright gold colour. When dry, polish, or burnish it; and if you intend to paint upon it with oil-colours, you may leave those spaces, where the paintings are to come, bare, without any gilding. The gilding about it you may stamp with various kinds of figures, engraved on punches, in iron or steel, laying the leather flat on a slab.

To keep Whites of Eggs, for some time, for the above Use.

TAKE the whites of eggs, without breaking them in any wise, and put them in as much vinegar as shall suffice to cover them; leave them thus for the space of two or three days; then strain them through a coarse linen cloth, and leave them so for eight days together; strain again through a finer cloth, and put it up in a glass phial, to have it ready upon occasion. This is a secret not much known.

To make a Liquid that will stain Bone or Wood.

TAKE strong white wine vinegar in a glass vessel, and put to it filings of copper, with some Roman vitriol, roach-alum, and verdigrise, and leave it thus infused for seven days; then boil it in some vessel, and by putting into it bone, ivory, or wood, it will penetrate, and give it a green colour; but if you will dye them any other colour, as red, blue, or yellow, you put Brasil-wood, indigo, French berries, or any other such colours, to infuse in the vinegar, with a little roach-alum.

To make a very powerful Cement.

TAKE the brick-dust two pounds, quick-lime four pounds, oil of linseed a sufficient quantity to temper the whole mixture; then use it before it dries. You may make half, or a quarter the quantity, or as much only as you shall have occasion for immediately.

A Gold-colour to write with.

TAKE out the white from a new-laid egg; then take two parts of quick-silver, and one part of sal-ammoniac, that is clear and well beaten; put these things upon the yolk of the egg that remains in the shell, and mingle all well together with a stick, after which close the egg with the piece of shell you took off, and some wax, that nothing may get in or out of it; then set it upright in horse-dung, covering it first with another half egg-shell, and then with the dung: thus leave it for the space of twenty, or five and twenty days, and you shall have a fine gold-colour to write with. If the substance be too hard, or too thick, you may temper it with gum-water.

Another Liquid for the same.

TAKE the peels of citrons or oranges that are of a deep colour, and clear them well of all the white that is within; then stamp them well in a stone or wooden mortar, thoroughly cleaned: take also good yellow sulphur, that is clear and bright; beat it to a fine powder, and mingle it with the stamped peels, well together: this done, put the whole into a phial, and set it in a deep cellar, or cave, or in some moist place, for the space of eight or ten days. After which time, take and heat it again by the fire; and then write or paint with it, and you will find it a very excellent gold-colour.

A useful Lamp.

THIS kind of lamp consists of two parts; viz. the lamp A, *fig.* 3, *plate* XXII. with the nozle made after the common manner for receiving the wick; and of a vessel for supplying the lamp with oil, B. This vessel is close a-top, by being inverted, and has several small holes c. c. at the mouth or bottom, round a larger pipe D, which is soldered in the middle, and reaches almost to the upper part of the vessel, to enter about a quarter of an inch within the lamp, which has four large holes. Through the orifice at E, upon turning the vessel upside down, the oil is poured in without much difficulty, and, when filled, the orifice E is stopped with the finger: the vessel is now put in its proper situation upon the lamp, by quickly removing the finger from the lower orifice E. The little holes or pipes round the orifice should be exactly over the holes in the cover. The vessel may commodiously be made of glass, and nicely soldered to a metal rim F. G.

To imprint Medals of Gum-tragacanth.

TAKE six ounces of gum-tragacanth, and steep it in strong vinegar, for the space of three days; then beat and stir it well together, and add some fine plaster of Paris to make it of a sufficient substance: if you will have it of a different colour, you may mix it with such coloured powders as you like best; if blue, with fine smalt; if red, with vermilion; if green, with green verditer, or finely powdered verdigrise; if yellow, with masticot, or powdered Dutch pink; if orange-colour, with orpiment. After you have thus prepared your dough to a proper consistence, you take your hollow forms, or moulds, and anoint them a little with sweet-oil, and fill them with the said dough, or paste, pressing it gently down with your fingers; and, having trimmed it round the rim with a pointed knife, set it in the sun to dry, and you will have a fair and neat impression of your mould. Of this paste you may form and make various kinds of toys.

To make various Things in Imitation of Amber.

TAKE the yolks of sixteen eggs, and beat them well together in an earthen pan well glazed; then take two ounces of gum-arabic, and one ounce of the gum of cherry-trees; reduce them into powder, and mix them with the yolks, that they may dissolve and be incorporated, by stirring them frequently about; this done, set them for six or eight days in the sun, and they will, by degrees, grow harder and harder. You may, before they are thoroughly dry, form or impress what you will in some mould, and lay them again in the sun, or some warm place, to dry; and whatsoever you have made, will look clear, of the colour of amber, and have the same natural qualities of drawing up a straw or paper.

Another Composition to answer the above Purpose.

TAKE the shells of cockles, snails, or white muscles; wash them clean, and, when dry, reduce them into a fine powder; put them into a clean pan; and having covered and luted the pan very close, place it in a furnace, or lime-kiln, that it may be thoroughly burnt, when you will have a fine white powder: then take some yolks of eggs, and beat them well in an earthen pan, and mix with the powder, working it into a dough; of which you may form what you think proper.

To know whether Wine contains Water.

TAKE raw pears, and pare them clean, and cut them in two in the middle; or else, take mulberries, and cast either the one or the other into the wine; if they swim on the surface, it is good and clean wine, without water; but if they sink to the bottom, you may conclude that it is adulterated, and mixt with water.

To make a Light burn under Water, in order to decoy Fish together about it, for the Net.

You may make use of a Florence flask, *fig.* 4, *plate* XXII. or have one made at the glass-house, to answer the same purpose: let there be a hole at bottom, to fix a candle in the inside of the bottle, with screwed sockets, to which a weight is to be fixed sufficient to draw the body of glass under water. The neck of the bottle you leave open, about which you fix a round board: at the inside of the edges you place several pieces of looking-glass: the light of the candle will multiply, in rays, according to the number of the pieces, and the fish will be thereby decoyed, and assemble in great numbers about it; so that flinging your net, you will catch them up with ease.

Another Decoy for Fish.

Provide a wooden cylinder, as A, *fig.* 5, *pl.* XXII. to the top whereof fasten two sticks, or two pieces of wire, across one another, the ends passing through four pieces of cork, b, c, d, e; these fasten again to a round board F, the side furnished with several pieces of looking-glass. You may draw through the corks another wire, or fix them to a hoop, to keep them steady. Put a candle into the cylinder, the light whereof will answer the same purpose as the above. The figures will illustrate the shape of both of them.

To make Moulds for Paper-frames, and other things, as fine as if fresh carved.

TAKE shavings of paper, and soak them in clean water for the space of six or eight days; then boil them for about two hours in clean water; this done, take them out of the pot, with as little moisture as possible, and stamp them in a stone mortar, to a paste. When you think it fine enough, let it settle, pour off the water if any remains, and put the stamped paper into a linen bag, tied close: hang it in fair water, and keep it there till you have occasion to make use of it, shifting the water once a week, and it will keep good for twelve months together. When your mould is ready, you may at any time take off the said stamped paper, wringing out the water, and, tempering it with a little size, of what colour you please; put it on the mould, and with a spunge press it down, and soak up the superfluous moisture from it. Having thus filled your mould, set it in the sun, or a warm room, and, when dry, it will easily come off the mould, and be like plaster of Paris, of a beautiful white. You may, if you will, afterwards paint or gild it, or make any use you intended. It will make frames to pictures; likewise paper-hangings, snuff-boxes, and many other things. You may cover them with a clear hard varnish.

terfeit all Sorts of Green Leaves, on Paper.

reen leaves of trees, shrubs, plants, and flowers, rate size; bruise or flatten the ribs of the back part with a knife; this done, have ready a dabber made of a round piece of white glove leather, the bigness of the palm of your hand, or larger, filled with cotton, or wool, and tied close into a ball; then, on a plate or Dutch tile, mix some lamp-black with a little linseed oil. When thus you have every thing in readiness, lay your green leaf on a flat board, the smooth side downward; dip your ball in the black colour, work and spread it about, on the clean part of your plate, or tile, or on a piece of board; then black over the back-part of your leaf, by dabbing it with your ball. Having ready your paper, which must be a little moistened, you lay that side of the leaf which is furnished with colour, on the paper, and putting another thin paper over it, press it gently down with the palm of your hand; take it off, and you will have a fair impression of the leaf, to the finest vein. This, when thoroughly dry, you may colour either with sap-green or verdigrise, according to the colour of the leaf you have made an impression of. No miniature painter will exceed it by copying it with all his art. Some virtuosos have made a rare collection by this method, and composed a useful herbal, by only drawing or painting the stalk, and joining the impressions of the leaf to it.

How to colour polished Iron, or Steel, of a fine reddish, bluish, or blackish Colour.

Take your iron, and, after you have well polished and heated it a little, rub it over with some dragon's blood purified, and it will be of a fine transparent reddish colour. A blue colour may be brought upon iron or steel burnished, by laying it upon a clear charcoal fire, blowing lightly, until you perceive the blue colour upon your iron, and then taking it out presently; or, by heating your iron or steel first, and rubbing it over with a woollen cloth, dipt in indigo ground and tempered with salad oil. This blue is fitter for large work, as muskets, pistols, &c. and the former for swords, daggers, scimitars, and other small work. If you would have it a black colour, first clean and polish it, then rub it over with a piece of an old stocking dipped in a little salad-oil.

To

To lute or plaster Earthen Pots or Pans with Linen-cloth, to stand the Fire.

SOAK your linen-cloth in salt water, and let it dry by degrees in a shady place; then dip it in yolks of eggs well beaten. Having first rubbed the place you intend to lute, thinly over with the above, clap on your cloth, smooth and even; and, when dry, you may use your pan or pipkin, and set it on the fire for boiling any thing you have occasion for: it will be as sound as it was before it was broke or cracked.

To write White Letters on Black Paper.

PUT the milk of a fig-tree into a glass, and set it in the sun for the space of half an hour; after which, if you want to use it, mix it with gum-water, and write with it on white paper; when it is thoroughly dry, blacken the paper over with ink. When dry, rub it well with a linen-cloth, and the letters which you made with the milk or sap of the fig-tree and gum-water, will come off, and the letters remain white, they having been preserved by the above liquid. In case the milk or sap of a fig-tree cannot easily be had, you make use of the yolk of an egg, well tempered with water: write with it, and when dry, black and rub it, as directed before.

To make a Copper Vessel white like Silver.

TAKE one part of azure, two parts of mercury, three parts of white arsenic; mix them together; then take grease, and melt it in a pan, taking off the filth, and making it very clear; this done, put to it the above ingredients, working it up to an ointment, with which you anoint your copper vessel, inside and outside, well; then put it in a new box made of oak, or cover it all over pretty thick with fresh oak-leaves. Dig a hole in the earth, where the south sun may shine hot upon it, and bury it for the space of three months; at the end whereof take it out, clean it with water, and brush it well, and you will find your vessel to be changed from a copper into a fine silver colour.

To kill and harden Quicksilver.

PUT your quicksilver into an iron mortar, adding to it some oil of olives, or oil of bays, and set it on a gentle fire, letting it boil, but take heed the smoke get not to your face, for it is hurtful; supply it often with a little oil, or strong distilled vinegar, letting it boil till the mercury be killed; then take it out, for it is hard, and will endure the hammer.

To take off the gilding from gilded Silver or Copper.

TAKE pyrethrum (wild or bastard pellitory) boil it in strong vinegar, so as to prevent the steam from having any vent. After it has boiled for some considerable time, pour it into silver or copper cups gilded, and the gold will fall off, and sink to the bottom; or if you put a silver ring gilded, or any other thing, into that liquid, it will have the same effect.

To make Silk White.

AFTER you have scoured your silk, and before it is quite dry, hang it so as to convey the smoke of sulphur to it, and it will immediately become white, and look as though it were new.

How to paint upon Satin.

THIS is an art which many of the fair sex take great delight in: I shall, therefore, to oblige them, set down rules for performing it to the greatest perfection and beauty. The secret being unknown to many, will, no doubt, make it acceptable to such as are unacquainted with it.

I shall instruct them, first,

How to prepare Colours for painting upon Satin.

For Red.

TAKE the chips of the best Brasil-wood, and infuse them in good wine vinegar, for six or eight hours; then, adding some beer that is clear, boil it in a glazed pipkin, over a gentle fire, with some alum and gum-arabic; when you find the colour to your mind, take it off the fire, and filter it through a cloth, putting it up, when cool, into glass phials, for use.

For a Crimson.

MIX carmine with gum-water, wherein dissolve some white sugar-candy; you may shade it as light or as deep as you think proper, and it will look very beautiful.

You may likewise boil cochineal, having first beat it in a mortar to a fine powder, and mix it with alum, and cream of tartar,

For Purple.

TAKE fresh chips of logwood, and infuse them in clean water, with some alum, after it has stood for two or three days, add to it some gum-arabic, and it is fit for use.

For

For light Blue.

TAKE litmus blue, and boil it with some alum, quick-lime, and pearl-ash, in clean water, and you will have a pleasant blue to paint with on satin.

For a deep Blue.

YOU may grind Prussian blue, to shade the litmus blue, tempering it with gum-water and sugar-candy.

For Green.

BOIL verdigrise with vinegar and salt; or only mix the verdigrise with vinegar in a phial, and set it to distil in the sun. If you will have it of a grass-green, add to it some yellow.

For Yellow.

INFUSE French berries in clean water, with some alum: after it has stood for a week, pour off your colours and dissolving therein a little gum-arabic, it will be fit for use.

You may make use of other colours that are fit for colouring of maps and prints, for which you will find sufficient instructions in the first volume.

To engrave with Aqua-fortis, like a Basso Relievo.

TAKE equal parts of vermilion and of black lead: two or three, grains of mastich in drops. Grind them all together, on marble, with linseed oil; then put this composition into a shell. Next to this preparation, cut some soft quills: and let your steel or iron be well polished.

Try first, whether your colour runs sufficiently with your pens: and, if it should not, you must add a little more oil to it; without making it, however, too limpid; but only so as to have your pen mark freely with it, as if you were writing, with ink, on paper. Then rub well your plate of steel with wood ashes, to clean and ungrease it; after which, wipe it with a clean rag, and draw your design upon it, with your pen, prepared as before, and dipped into your liquor. If you want to draw birds, or other animals, you must only draw the outlines of them with your pen, then fill up the inside of those lines with a hair-pencil; that is to say, you will cover all the space, contained between the first outlines drawn with the pen, with the same colour, which you will lay with a brush, to preserve all that part against the aqua-fortis. When that is done, let your work dry for a day or two. When dried, take some fire, made with charcoal in a chaffing-dish, and bake over it your colour, by degrees, till it becomes quite brown. Take care not to burn it, for fear you should scale it, when you come to scratch with the point of a needle those etchings, or places, which you want to be engraved, with aqua-fortis.

To engrave on Wood.

You begin by preparing a board, according to the size and thickness you want it, and finely polished on the side it is to be engraved. The sort of wood which is generally chosen for such purpose, is either pear-tree or box. And, of the two, this last is even still preferable, both on account of its being of a superior hardness, and also less liable to be worm-eaten. On that board you draw first your design, such as you want it to appear in printing. They who have not the talent of acquiring, make use of the very drawings given them, which they paste on their board, by the right side, with a paste made of good flour, water, and a little vinegar. Take care that all the strokes of the drawing touch well, and stick on the wood: and, when the paper is very dry, wet it gently, and with the tip of your finger rub it off by degrees, so that the strokes only of the drawing remain on your board, as if you had drawn it with ink and a pen. These strokes, or lines, shew you all that you are to spare, or preserve, all the rest you are to cut off and sink down with delicacy, by means of a sharp and well-tempered pen-knife, small chisel or *gouet*, according to the size and delicacy of the work, for you have no need of any other tool.

To preserve the Brightness of Arms.

Rub them with hart's marrow. Or, else, dissolve some alum powder with the strongest vinegar you can find (that of Montpellier, which serves to make their famous verdigrise, is the fittest) and rub your arms with it. By these means they keep bright and shining.

To give Tools such a Temper, as will enable them to saw Marble.

Make the tool red-hot in the fire; and, when red cherry-colour, take it off the fire, rub it with a piece of candle, and steep it immediately in good strong vinegar, in which you have diluted some soot.

To guard Iron against rusting.

Warm your iron till you can no more touch it without burning yourself. Then rub it with new and clean white wax. Put it again [illegible] fire, till it has soaked in the wax. When done, rub [illegible] with a piece of serge, and this iron will never rust.

An Oil, one Ounce of which will last longer than one Pound of any other.

TAKE fresh butter, quick-lime, crude tartar, and common salt, of each equal parts, which you pound and mix well all together. Saturate it with good brandy, and distil it in a retort over a graduated fire, after having adapted the receiver, and luted well the joints.

A Varnish for Floors.

PUT a little rock-oil with varnish and turpentine, and stir well. Lay it on your floors with an old hair broom, after having mixed in it the colour you want them to be.

A Varnish to lay on Canvas Sashes.

TAKE fine and clear turpentine, four ounces; oil of nuts, two. Melt all together over a fire; and when it begins to boil, scum it, and use it hot with a brush.

How to imitate a Black Jasper, or variegated Black Marble.

TAKE sulphur-vivum, quick-lime, aqua-fortis, and the green rind of walnuts, equal quantities, one ounce of each. Dilute all together; then lay it with a brush on what you want to be jaspered, whether a column, a table, or any thing else. This done, put your table or column, &c. thus blackened, in a dunghil, for the space of twelve days, and then take it out again. Yo[illegible]ll find it well veined and variegated. To give it a [illegible]oss afterwards, you rub it with a varnish composed [illegible]scribed hereafter.

Another

Another Way.

MAKE a large ball, with the drugs prescribed in the above receipt, to compose your black. Lay it for a week in a dunghil. When, by that means, it is well variegated, rub your intended piece of furniture with it. This being thus variegated, you lay on it the following varnish, to give it a fine lustre.

An excellent Varnish to give a fine Gloss to the above-mentioned Jasper, or variegated Black Marble.

TAKE oil of spikenard, three ounces; sandarac, well picked and clean, two. Have a new earthen pot well glazed. Set it before the fire a warming, without any thing in it. When hot, throw in it one half of the sandarac, and one half of the oil. Stir well, lest it should burn, or stick to the pot. When it is nearly melted, throw in the remainder of the oil and sandarac. When all is well dissolved and mixed, add a piece of camphor, to take away the bad smell of this composition, and let it dissolve: then bottle and stop it for use. Warm it every time before you lay it on, for it requires to be used hot.

To make Sashes with Cloth, which will be very transparent.

TAKE a fine white cloth; the finer you choose it, the clearer and more transparent the sashes will be. Fix the cloth very tight on a frame. Then make some starch with flour of rice, and lay a coat of it, as smooth as you can, on your cloth, with a stiff brush of swine's hair. Lay that starch on both [illegible] the cloth, and let it dry. When it is perfectly dry, put on both sides also, of the said cloth, thus prepared, the following varnish, with a soft brush of swine's hair likewise, having care to lay it on as equally and smoothly as possible, and let it dry afterwards.

The Composition of Varnish fit for the above Sashes.

TAKE of the finest and whitest wax you can find, six pounds; of the finest and clearest Venice turpentine, two; one and a half of the most perfect linseed oil. Have a new and varnished pipkin, larger, at least by one-third, than is requisite to contain all these ingredients. Put, first, in this pot the linseed and turpentine oils together, and set it over a small charcoal-fire. When this begins to be a little warm, put in the wax, cut in small bits, and take care to mix all well with a very clean wooden stick, till the wax, being thoroughly melted, is also well incorporated with the rest.

Now, take the pot off from the fire; and, while this composition is still a little warm, give a coat of it on both sides of the cloth, fixed on the frames, and prepared as before directed, and let it dry in the shade.

Note. You may render your sashes still more transparent, if, on both sides of them, you lay a smooth and equal coat of the following varnish, with a soft brush; then let it dry.

A fine White Varnish.

TAKE one pound of fine Venice turpentine, and as much of spirit of turpentine. Put this in a glass-matrass, larger, at least by a third, than is wanted to contain the matter. Stop this matrass with another smaller matrass, the neck of which is to enter into that of the former. Have care to lute well both necks together with paste and paper; and, when the luting has acquired a perfect dryness, set the first matrass on a sand bath, then set the varnish a boiling, for near an hour, after which take it off from the fire, and let it cool. When cold, bottle and stop it for use.

Note. Turpentine, well purified from all its greasy parts, is the best, and fittest, to make the varnish for sashes.

To render Silk Stuffs transparent, after the Chinese manner; and paint them with transparent Colours likewise, in Imitation of the India manufactured Silks.

TAKE two pounds of oil of turpentine, very clear; add to it two ounces of mastich in grain, and the bulk of a filbert of camphor. Let this dissolve by a gentle heat; then strain it through a cloth. Of this oil lay one coat, or two, on both sides of your stuff. Allow, however, a sufficient time, between each coat, for each to dry, and let the second lie two days on, before you touch the stuff again. When that time is over, draw the outlines of your design, and flowers, &c.; cover this with a preparation of lamp-black and gum-water. Then fill the intervals with the intended and proper colours, suitable to the purpose; and which ought to be all transparent colours, diluted with a clear varnish. When this is done, and dry, lay on both the right and wrong sides of the stuff another coat of clear varnish.

To make a transparent Blue, for the above Purpose.

TAKE nine drachms of sal-ammoniac; six of verdigrise, distilled and exsiccated. Put both these into powder. Dilute these powders with tortoise oil. Put this on a very thick glass, which you stop well, and set over hot ashes for a week. After that time your colour will be fit for use. Make your drawings with the clear varnish, as directed in the preceding article.

To make a transparent Yellow, for the same Use.

TAKE a new-laid egg of that very day, make a hole in the shell, to draw the white out of it. Replace, by the same hole, with the yolk, two drachms of quicksilver, and as much of sal-ammoniac; then stop the hole with wax. Set that egg in hot dung, or over a lamp-fire, for four or five and twenty days. When that time is over, break the egg, and you will find a very fine transparent yellow, fit for the use above-mentioned.

To make a transparent Green.

TAKE verdigrise, gold litharge, and quicksilver, equal parts. Grind the whole in a mortar, with the urine of a child. Put it next into a bottle, and set it over a gentle and slow fire, for the space of seven, or eight days. This composition will give a very fine transparent green, for the above purpose.

To give the above-mentioned painted Silks, all the Smell, and Fragrancy, of the Indian ones.

IT is well known, that the silks, and other things, we receive from India, have a certain particular smell, and agreeable fragrancy, which, being their peculiar, distinctive, and most obvious character, if not imitated also, would help not a little in ruining the deception intended by the above labour. To imitate, therefore, even this, you must observe the following direction: have a small closet, if it be for works at large; or only a fine basket with a top to it playing upon hinges, stuffed and lined all over in the inside, if it be for one single piece of silk. Put, in either of them, and according to their extent, a proportionable quantity of cloves, whole-pepper, mace, nutmeg, all-spice, camphor, &c. &c. Put your works among these ingredients, and keep either the closet, or the basket, perfectly close shut, till you find they have received a full impression from the odour of those ingredients.

L'Abbé Mulot's Varnish.

Take of spike oil, one ounce; pulverized sandarac, half an ounce. Put all in a bottle, and set it in the sun till perfectly dissolved. This composition is particularly fit to varnish gold or silver, in shell, which has been laid on with a hair pencil.

To mend all Sorts of broken Vessels.

Take any quantity of white of eggs, and beat them well to a froth. Add to this soft curd cheese, and quick-lime, and begin beating a-new all together. This may be used in mending whatever you will, even glasses, and will stand both fire and water.

Another, for the same Purpose, which resists Water.

Take quick-lime, turpentine, and soft curd cheese. Mix these well together; and, with the point of a knife, put of this on the edges of the broken pieces of your ware, then join them together.

A cold Cement for Cisterns and Fountains.

Take litharge and bole in powder, of each two pounds; yellow ochre and resin, of each four ounces; mutton suet, five ounces; mastich and turpentine, of each two ounces; oil of nuts, a sufficient quantity to render it malleable.—Work these all together; and, then it is fit for use.

To

To clean Pictures.

TAKE the picture out of its gilt frame. Lay a clean towel on it, which, for the space of ten, fourteen, sixteen, or eighteen days, according as you find it necessary, you keep continually wetting, till it has entirely drawn out all the filthiness from the picture. Then, with the tip of your finger, pass some linseed oil which has been set a long while in the sun to purify, and the picture will become as fine as new.

A fine Red Water.

1. PUT, in a new glazed pipkin, one ounce of Brasil-wood, finely rasped. Pour three pints of spring water on it, with six drachms of fine white isinglass chopped very small. Place the pot on warm ashes, and keep it there for three days, during which you are to keep up the same degree of heat.

2. When the isinglass is melted, add two ounces of kermes in grain, one of alum, and three drachms of borax, all of them well pounded into powder. Boil this gently to the reduction of one half; then strain the liquor through a cloth, bottle and stop it well, and set it in the sun for a week before using.

Note. This water may very properly be used as a wash to give an agreeable bloom to pale faces.

A very fine Method for Marbling Paper.

THE paper must first be prepared, that it may more easily retain the colours. This preparation is performed by wetting the paper with a sponge dipped in roach-alum water, then letting it dry. When the sheets have been thus prepared, have a pan full of water, and, with a large and long-handled painting-brush, take of one colour, and shake it in the water; take of another and do the same, and so on till you have taken of all the colours you intend to have on your paper, and which you are supposed to have there already by you. Each of these colours fall to the bottom of the water; but take, with a similar brush as the first, a mixture of bullock's gall, and of dissolution of soap in water, then shake on the water, and all over its surface, and you will soon see all the colours rising up again and swimming on the top of the water, each separately as you first put them. Then lay the sheet of paper on it, give it a turn on one side or the other, as you like, and take it up again; wash and set it to dry, then burnish it, and it is done.

To gild on Vellum.

Mix some saffron in powder with garlic juice. Put two or three coats of this on the vellum, and let it dry a little, but not quite. Then breathing on the coat, apply the gold leaf with cotton; and, when dry, burnish it.

To gild on Calf and Sheepskin.

Wet the leather with whites of eggs. When dry, rub it with your hand, and a little olive oil; then put the gold leaf, and apply the hot iron on it. Whatever the hot iron shall not have touched will go off by brushing.

Gold and Silver in Shell.

1. Take nitre, gum-arabic, and gold leaves, and wash them all together in common water. The gold will sink to the bottom, whence pouring the water off you may then put it in the shell.

2. The silver is worked [illegible] same manner, except the nitre, instead of which you put white salt.

To whiten Bones, or Ivory.

PUT a handful of bran and quick-lime together, in a new pipkin, with a sufficient quantity of water, and boil it. In this put the bones, and boil them also till perfectly freed from greasy particles.

To imitate Tortoise-shell with Horn.

TAKE one ounce of gold litharge, and half an ounce of quick-lime. Grind well all together, and mix it to the consistence of pap, with a sufficient quantity of chamber-lye. Put of this on the horn; and, three or four hours afterwards it will be perfectly marked.

To make Figures, or Vases, with Egg-shells.

1. PUT in a crucible any quantity of egg-shells, and place it in a potter's furnace, for two days, that they may there be perfectly calcined; then grind them dry into a subtile powder.

2. Next, with gum-arabic water and whites of eggs beaten together, make a liquor, with which you are to knead that powder, and make a paste or dough of it.

3. With that dough, to which you give the consistence of potter's clay, make and form whatever figure or vase you like, and set them in the sun to dry.

To write on Grease, and make the Ink run on it.

1. Cut a bullock's gall open into a pan, and put a handful of salt and about a quarter of a pint of vinegar to it,

which you stir and mix well. Thus you may keep the gall, for twelve months without its corrupting.

2. When you are writing, and you find your paper or parchment greasy, put a drop of that gall among your ink in the ink-horn, and you will find no more difficulty to make your pen mark.

An Ink-stone, with which Ink-stands may be made, and with which you may write without Ink.

Take gum-arabic, fourteen ounces; lamp-black, thirteen; and burnt willow-wood coals, three. Pound the gum into an impalpable powder, and dissolve it into a pint of common water. This done, knead your abovementioned powders with part of this gum-water, so as to make a paste or dough of them, as it were, for bread With this dough form ink-stands of the shape and form you like best, and in these ink-stands, while the composition is still soft, you may stamp a few small holes.

2. This done, dry these stands in an ardent furnace for four hours, or in the shade a sufficient time. When dry, brush them over with your afore-mentioned gum-water, till they appear as black and shining as jet, and as hard as marble.

3. When you want to use them, put a few drops of water in one of the holes, and put a pen to soak in it at the same time. If the water be but just put in, the ink will not be quite so black, but if it have remained a little while, it will be as black as the blackest of any inks.

A Secret to revive Old Writings which are almost defaced.

Boil gall-nuts in wine; then, steeping a sponge into that liquor, and passing it on the lines of the old writing, all the letters which were almost undecypherable will appear as fresh as newly done.

An Ardent Water to engrave Steel deeply, or even eat it off entirely.

TAKE two quarts, or thereabout, of thick black wine, the oldest and the best you can find. Dissolve in it quick-lime and sulphur, in powder, wine tartar and white salt, of each equal parts, and as much of the whole as there can possibly be dissolved in that quantity of wine. You shall next put all that mixture into a cucurbit, or rather in a retort well luted. Adapt to it a bolt-head to serve as a receiver. Lute well the joints; then give it the heat gradually. There will distil a very mordant water, which you may keep in a phial, carefully stopped, for use.

To break an Iron Bar as big as the Arm.

TAKE melted soap with which you rub your iron bar at the place where you would have it break. Then with any thing take off and clean away part of that unction, in the middle of it, about the width of half-a-crown. Then take a sponge, dipt into ardent water; bring it round the bar, and, in six hours, it will break.

To encrease the Virtue of a Loadstone.

You must let it soak, for forty days, in iron-oil.

To soften Steel.

TAKE a discretionable quantity of garlic, rob them of their coarsest peel, then boil them in oil of nuts till reduced into an unguent. Cover well your steel all over with that composition to the thickness of half-a-crown. When this is done, put your steel, thus covered, in the forge, in the live coals, and it will become soft. To restore it afterwards to the temper, called by artists *red cherry colour*, you must, after having made it red-hot, plunge it in the coldest water.

To whiten Copper so as to make very fine Figures with it.

TAKE five parts of copper, which you melt in a crucible; then throw in one part of zinc. As soon as the zinc is in it, take it off from the fire, and stir the matter a little with an iron rod; then cast it in the moulds of your figures. They will look like silver ones.

To give the finest Colour of Gold to Copper, in order to make Statues, or other Works, with it.

TAKE one pound of copper, melt it in a crucible; then throw in it one ounce of Alexandrian tutty, reduced into a subtle powder, and mixed with two ounces of bean-flour. Take care to keep stirring this matter, and to guard yourself against the fumes. After two hours of fusion, take this composition off, and wash it well, and put it again in the crucible, with the same quantity, as before, of the same powders. When melted a second time, take it off, and cast it in the moulds you had prepared for it.

To take, immediately, Rust from Iron.

YOU must rub your iron with a piece of rag steeped in oil of tartar *per deliquium.*

To melt Iron, so that it will spread under the Hammer.

TAKE equal quantities of lime, tartar, and alkali. Pour over it a sufficient quantity of cow-piss, to make a thick pap with it, which you set a-drying in the sun, or before the fire. Make an iron red-hot in the fire, then, plunge it in that matter. You may afterwards melt it as you would silver; and, then, work it the same way, when cold.

To give Iron a Temper to cut Porphyry.

MAKE your iron red-hot, and plunge it in distilled water from nettles, acanthus, and *pilosella* (or mouse-ears), or in the very juice from the plants.

To melt or calcine the Blade of a Sword without hurting the Scabbard.

You must drop into the scabbard of the sword some arsenic in powder, and squeeze over it some part of the juice of a lemon. Then replace the sword in its scabbard. In a quarter of an hour afterwards, or little more, you will see what a surprising effect this will have.

To solder Iron, or any other Metal, without Fire.

1. TAKE one ounce of ammoniac, and one of common salt; an equal quantity of calcined tartar, and as much of bell-metal, with three ounces of antimony. Pound well all together and sift it. Put this into a piece of linen, and inclose it well all round with fullers' earth, about one inch thick. Let it dry, then put it between two crucibles over a slow fire to get heat by degrees. Push on the fire till the lump contained in the crucible becomes quite red-hot, and melt all together. Then let the vessels, and the whole, cool gradually and pound it into powder.

2. When you want to solder any thing, put the two pieces you want to join on a table, approaching their extremities as near as you can one to another. Make a crust of fullers' earth so, that holding-to each piece, and passing under the joint, it should be open over it on the top Then throw some of your powder between and over the

joint. Have again some borax, which put into hot wine till this is consumed, and with a feather rub your powder at the place of the joint; you will see it immediately boiling. As soon as the boiling stops, the consolidation is made. If there be any roughness you must smoothen it by rubbing with a grinding-stone, for the file will have no power over it.

To render Iron as white and beautiful as Silver.

TAKE sal-ammoniac in powder, and mix it with an equal quantity of quick-lime. Put them all together into cold water, and mix well. When done, any iron piece, which you shall have made red-hot, will, if you steep it in that prepared water, become as white as silver.

To calcine Pewter and render it as white, and as hard, as Silver.

MELT well your pewter in a crucible, so that it may be very fine and clear. Pour it afterwards into a very strong vinegar, then into mercurial water. Repeat that operation as many times as you please; you will each time give it an additional degree of hardness and whiteness, drawing near to silver, so much that it will, at last, be very difficult to distinguish it from silver itself.

A Red Varnish.

1. TAKE three ounces of gum-lac, half an ounce of sandarac, as much of mastich in drops, and a pint of true French spirit of wine. Put all in a matrass, which you must take care to lute well with potter's clay, and stop with paper. Have a large iron kettle, two parts of which shall be filled with sand. Place the kettle over the coals, and lay the matrass on the sand. Get the composition o

boil in that situation for three hours. Strain it through a sheercloth; bottle and stop it well; and keep it for use.

2. To make this varnish red, you put one ounce of vermilion to six of the said varnish. But to dilute the vermilion, you must begin by pouring, first, some oil of spike over it, and then the six ounces of varnish, which will take near a quarter of an hour to mix well together.

3. Observe that the wood, on which you want to lay it, has been well polished. Rub it again, besides, with a pumice stone and vinegar, that all the pores may be well filled, and should appear no more. Then lay, with a brush, first a coat of simple varnish, without vermilion. Let this dry for three hours. Put on next your second coat, or that which is prepared with the vermilion; then a third and a fourth, according as you want it of a more, or less, deep red, and allowing a distance of three hours time between each coat of varnish, to let them dry.

4. If the last coat of varnish, after being dry, become rough, rub it with shavegrass dipped in oil of olive. After which rub it again with a cloth, till it become bright. Over this, when done, lay another coat of *pure* varnish, like the first. And this coat, as well as all the others, must be left to dry, at least three hours.

5 As for the black and venturine, you must first lay a coat of varnish on the wood; then, while fresh, sift the venturine over it, and let all dry for three hours. When dry, you lay one, two, three, or more, coats, of varnish, according to your judgment or liking, and allowing always three hours to dry between each coat. Then polish, and give the final coat after.

A Varnish which drys in Two Hours Time.

MELT four ounces of yellow amber, in a new earthen pan, over kindled coals Take care, in that operation, that the fire should but just reach, and touch, the bottom of the pan, and none should rise along the sides. Never cease to stir, from the moment it is melted, with a deal stick, and add, directly, one ounce of sealing-wax. As soon as this is also melted, add again one spoonful, or half an ounce, of linseed oil, previously thickened with a little gold litharge; then take it off from the fire, and cease not to stir as before. When the matter begins to be a little cold, then is the time of adding what quantity of turpentine oil you may find necessary to make a true varnish of it.

A Varnish for Copper-plate Prints.

PREPARE water with some isinglass. Lay, with a very soft brush, a coat of this on the print. Next to this, lay another of the following varnish. True French spirit of wine, half a pound; gum-elemi, two drachms; and sandarac, three.

A Varnish to be used on Plaster, and any other Sort of Materials.

To the varnish of copal and spirit of wine, only add some calcined talc.

How to make a Red with Varnish, of a much higher Hue than Coral itself.

TAKE Spanish vermilion; grind it on a marble with brandy, and add to it the sixth, or eighth, part of lac.—When done, mix this composition with as much varnish as you may find it requisite to apply.

To make it gridelin Colour.

DILUTE with your varnish some blue verditer, lake, and whitening.

To make it Green.

SUBSTITUTE for the above ingredients, German green verditer, pewter in grain, and white lead.

Another Way for the same.

GRIND, with water, on a marble stone, the finest orpiment you can find, and a little indigo. Let it dry, then pound and mix it with varnish.

To make it Yellow.

TAKE some Naples yellow, and mix it well with your varnish; then use it.

To make it Blue.

TAKE ultramarine, lake, and whitening, and proceed as ordered in the other receipts above-mentioned, and according to the directions of your judgment and experience from them.

A most beautiful Chinese Varnish.

TAKE one ounce of the whitest karabe (amber); or, instead of this, the same quantity of the whitest gum copal: four drachms of sandarac; two, of fine mastich, in drops. Put all this, reduced into a powder, in a fine glass matrass; then, pour over it one ounce of the finest turpentine oil. Stop the matrass first with a cork, then with a bladder wetted. Set this to infuse, over a slow fire, for twelve hours. After this, uncork, and let cool the matrass; then pour, gently, in it six ounces of good spirit of wine, and stop it again as well as before. In that situation, set it on ember ashes, or, rather, in *balneo mariæ*. In the space of another twelve hours, you will find that the spirit of wine shall have dissolved all the gums. Then, while the varnish is still quite warm, strain it through a cloth; bottle and cork it, to keep for use.

A Varnish to gild with, without Gold.

TAKE half a pint of spirit of wine, in which you dissolve one drachm of saffron, and half a drachm of dragon's blood, both previously well pulverized together.—Add this to a certain quantity of shell-lac varnish, and set it on the fire with two drachms of socotorine-aloes.

Callot's Varnish, or Etching-ground.

1. TAKE two ounces of the finest linseed-oil; Benjamin, in drops, two drachms; virgin-wax, the bulk of a filbert. Boil all this together, till it is reduced to one-third, and, while it is a boiling, never cease to stir with a little stick. When done, bottle, or put it in a large-mouthed vessel.

2. To use that varnish, warm a little the plate you intend to engrave upon and, taking a little of the varnish, with the tip of your finger, spread it delicately over the plate. Observe to put as little of it as you can; and to lay it on as smooth and equal as possible. When done, smoke the plate, on the varnished side, with a candle, passing and repassing it gently, over the flame of it, till it is black every where. Set it again, now, on the chaffing-dish, wherein there are kindled charcoals; and, when the

plate has done fuming, then the varnish is sufficiently hardened. You may then chalk, draw, and etch, whatever you will on it.

Such is the true receipt of the varnish, which the famous Callot made use of, to engrave his most admired, and truly admirable, subjects.

A Varnish to lay over Plaster-works, or Figures.

TAKE fine white Alicant soap; rasp it fine, and put it in a well glazed pipkin. Dissolve that soap, in the pipkin: with your finger stir in a little water, added gradually, and little at a time, till it comes thick and milky. Cover this, for fear dust should come to it; and let it rest so for seven or eight days. Take, next, a soft and short hairy brush; dip it in this soapy preparation, and wash the plaster figure all over with it, then set it to dry. When dry, rub it gently with a piece of cloth, placing yourself between it and the light, that you may perceive better the places which take the polish; when done, thus, every where, your statue will appear as white, shiny, and beautiful, as alabaster.

Sealing-wax.

TAKE one pound of shell-lac; Benjamin and black resin, half an ounce each; vermilion, eight drachms. The whole being melted, make your sticks on a marble table rubed over with oil of sweet almonds; and take care to have done before the wax is cold.

An excellent Sealing-wax, by Girardot.

1. TAKE four ounces of resin, and four and a half of whitening, and melt them together, in a non-varnished pipkin, over kindled coals. While this is in fusion, have

another pot, similar to this, in which you keep two ounces of shell-lac, in dissolution with vinegar. Now steep a wooden stick in the first pot, and another in the other pot; then, over a chaffing-dish, turn quickly one over another, the ends of your two sticks together, to mix and incorporate well what matter they shall have brought along with them from each pipkin. And when, after having turned them thus a reasonable time, you see both matters are well embodied, steep them, at different times, in the following liquor, to colour them.

A Colour for the above Wax.

GRIND, upon a porphyry table, two ounces of cinnabar, with a sufficient quantity of nut-oil, to make it a liquid. In this you dip your sticks, at several times; and take care, in doing it, the composition should not grow cold. Wherefore you must, each time you steep them in the colour, carry them again over the chaffing-dish, to keep them in a due state of malleability. And when you find the matter sufficiently tinged with red, form your sticks as usual, on a marble, or other well polished table.

A Water to harden Artificial Stones.

PREPARE and calcine, as is usual for crystal, some small bits of calaminary stone. Pulverize them, and then place that powder in a very damp cellar, till reduced into water. With this water, knead some Roman, Dutch, or Hungarian vitriol, quite crude, without reddening it in the fire. When this paste, which is to be soft, is made, put it in a retort, and distil what water will come from it. With this other water, and some barley-flour, make another paste quite hard. In this paste put your lump of composition, or even the stones themselves, which are come from it, ready cut and polished, when they come out of the wheel, and make up a dumpling of the whole. Send it to the oven, to be put in, and taken out, along with the bread. When your paste comes back from the oven, open it, and you will find your stones as hard as natural ones.

Suppose they should not prove quite so hard as you wish them to be, repeat this operation once more, and they will then, most certainly, be as hard as true diamonds.

To give a Crystal a perfect Hardness.

DISSOLVE what quantity you like of urine-salt in clear water. Filter and evaporate to dryness. Then make alternate *strata super strata* of this salt, and powder-crystal in a very strong crucible, which you set afterwards for eight days in a glass-maker's furnace. After that time, being cooled gradually, you may take it out, and get the composition out, which will prove excessively hard.

To soften Crystal.

REDDEN it in the fire, and when full of fire, plunge it in mutton and lamb's blood mixed and warmed together. Reiterate this two or three times, and it will be soft

Another Receipt to soften Crystal, or any other coloured Stone, so that you may cut it like Cheese, and restore it afterwards to its primary Hardness.

1. TAKE, in the month of August, goose's and goat's blood. Let each of them dry, till very hard. Then, when you want to soften your stones, take an equal quantity of each blood, pulverize it and put it in a pot, then pour over a strong lye made of pearl-ashes. Leave it so for a while, stirring all well and often: then, add about a pint of strong vinegar. In this preparation, if you set your

stones, and warm it a little over the fire, they will become so soft that you may take, and cut or form them afterwards as you will.

2. To restore them again to their former hardness, put them in cold water, and let them there lie for about one hour and a quarter, it will be quite sufficient.

3. But to give them their lustre again, you must take antimony in powder, spread it on a very smooth leaden table, then polish your stones on this. It will restore them to their brightness as before.

To jasper Glass Globes.

WET the inside of a glass globe with common water, then, throw in some powder-blue, or ultramarine, and stir well the globe, that these powders may stick every where. Then dilute some other colours with [illegible] oil, keeping each particular colour by itself. With the [illegible] end of a quill, or a long-handled brush, put some of these colours, one after another, in the globe, touching it every way with them. Put some flour after that in the globe, and shake it so as to make it go all over, and then the work is finished.

To give Globes a Silver Colour.

To four ounces of pewter, in fusion, add two of quicksilver. Stir all well with a wooden spatula, and, when the whole is well incorporated, pour some of this compound into your globes, which must previously have been warmed before the fire. Turn them again in all directions, that the composition may fix itself better, and more equally, in all their capacity.

To make Transparent Colours.

For Green.

PUT into very strong vinegar, verdigrise, rue-juice, and gum-arabic. Set this in the sun for a fortnight, or, if you have no sun, boil it on the fire. Strain it; bottle and stop it.—Shake it well before using.

For Red.

MAKE a lye with salt of tartar. In it put to infuse for one night, some India-wood, with a little alum. Boil all, and reduce to one-third. Run it through a linen cloth, and mix some gum-arabic with it.—With more or less alum, you make it of a higher or paler hue.

For Yellow.

BRUISE Avignon-seed, which we, in this country, call French berries, and put it in a lye of salt of tartar, to boil on the fire to the reduction of two-thirds. Run it, and boil it one bubble more. Then bottle and cork it.—It must be shaken before using.—A small addition of saffron renders it more lively.

For Blue.

SOAK in chamber-lye, for one night, a certain quantity of German *Palma Christi*. Take it out and grind it with a little quick-lime.—More or less quick-lime will raise or lower it in hue. And nothing more is required to dilute it than chamber-lye and gum-arabic.

Another Blue, very like Ultramarine.

GRIND some indigo, on porphyry, with turpentine oil. Put it afterwards in a glazed pipkin and lute it well. Let it thus lie for the space of six weeks. The longer you leave it there, the more blue it will be.

A good Way to make Carmine-colour.

MAKE a little bag, tied very close, of fine Venetian lake. Put it in a little varnished pipkin, with rain-water and cream of tartar, and boil it to a syrup. Thus you will have a fine carmine colour.

To make Bistre for a Wash.

1. GRIND on marble, with child's urine, some chimney-soot, so long as to bring it to be as fine as possible. When done, put it in a wide-mouthed bottle, which fill up with clear water; and then, stir and mix all well with a wooden spatula. Let the coarsest parts settle for about half an hour's time, and fall to the bottom of the vessel. Decant out now the liquor gently into another vessel. What remains in the bottom of the first bottle, is the coarsest bistre.

2. Proceed the same with respect to the second bottle, and after having left this to settle for three or four days, instead of half an hour, decant it into a third. This gives you the finest bistre.

3. It is thus you are to proceed in the manipulation of all the colours which are intended to serve in drawing, for wash, whenever you will not have them rise thick above the surface of the paper, which would undoubtedly look very bad, for the neatness required in a draught, forbids the use of any coarse colour.

A Secret for a fine Red Wash.

1. Make a subtile powder with any quantity of cochineal. Put it in a vessel, and pour so much rose-water over it as will exceed it by two fingers.

2. Dilute calcined and pulverized alum, while it is yet quite warm, into plantain-water, and mix some of the liquor in which you have dissolved the cochineal.

3. This process will give you a very fine red, much preferable to that which is made with vermilion, because this last has too much consistence, and, besides, tarnishes too soon, on account of the mercury which enters into its composition.

A Secret to render old Pictures as fine as new.

Boil in a new napkin, for the space of a quarter of an hour, one quarter of a pound of grey or bril-ash, and a little Genoa soap. Let it cool, so as to be only lukewarm, and wash your picture with it; then wipe it. Pass some olive-oil on it, and then wipe it off again. This will make it just as fine as new.

A Wash to clean Pictures.

Make a lye with clear water and wood ashes; in this dip a sponge, and rub the picture over, and it will cleanse it perfectly. The same may be done with chamber-lye only; or otherwise, with white wine, and it will have the same effect.

Another Way.

Put filings in a handkerchief, and rub the picture with it. Then pass a coat of gum-arabic water o [illegible]

To take off, instantly, a Copy from a Print, or a Picture.

MAKE a water of soap and alum, with which wet a cloth or paper; lay it either on a print or picture, and pass it once under the rolling-press; then going round the other side to take it up, you will have a very fine copy of whatever you shall have laid it upon.

To gild without Gold.

PUT in a crucible one ounce of sal-ammoniac, and half that quantity of common mercury. Cover and lute well the crucible for fear the mercury should exhale. Give this a small fire for the space of half an hour. Increase the fire afterwards till the crucible is quite red-hot. Then throw the composition into a pan of cold water. As soon as this matter is cold, it will be as hard as a stone. Break and grind it, and dissolve it in gum-water. Wherever you lay a coat of this, it will look gilt.

PLATE I Vol. II

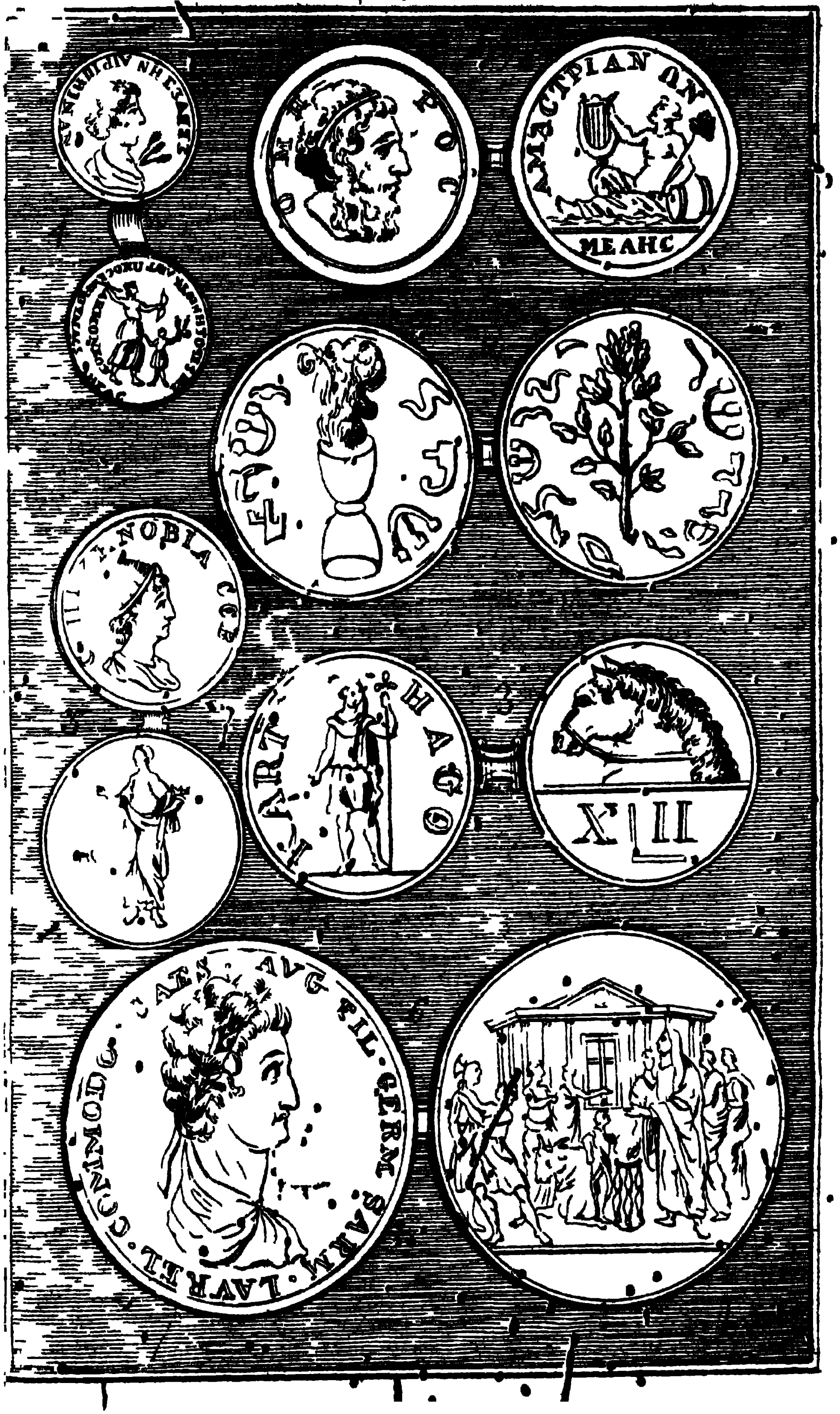
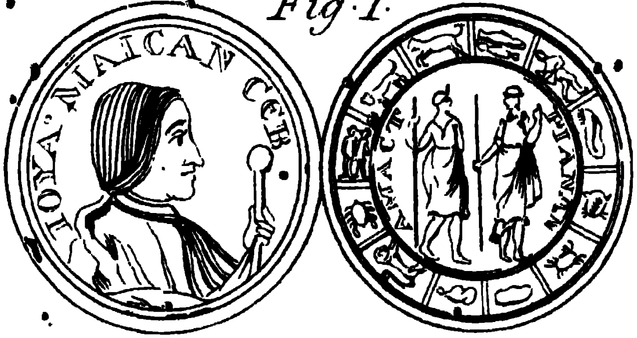


PLATE · II VOL II

Fig·1·



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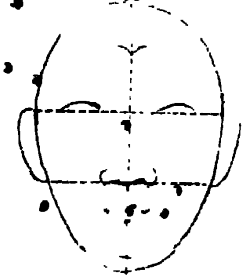
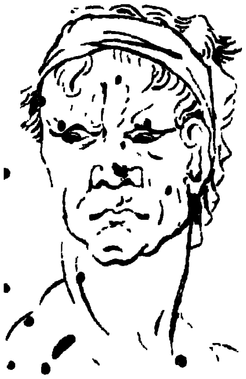


Fig·3.



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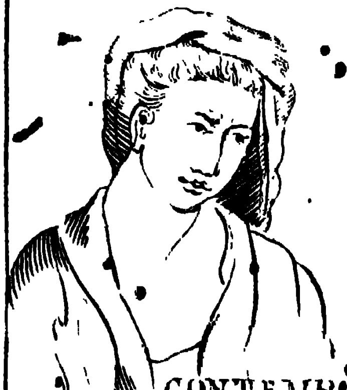

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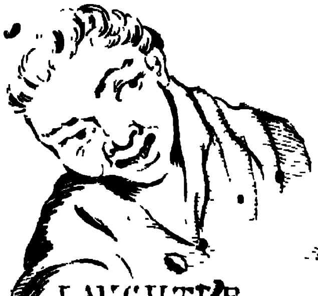
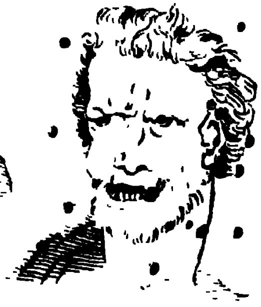


LAUGHTER



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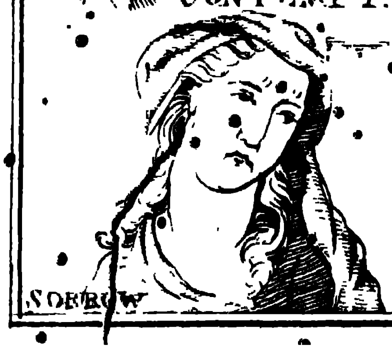
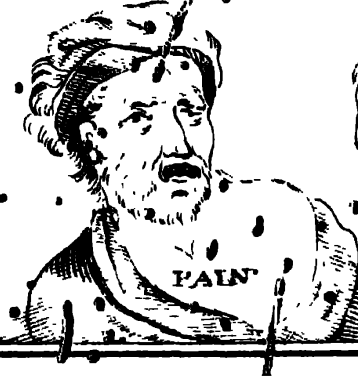
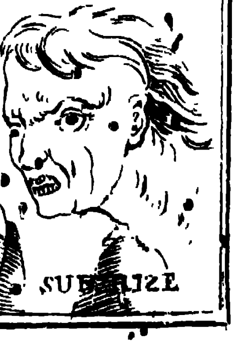


SORROW



PAIN



SURPRIZE

PLATE · III.

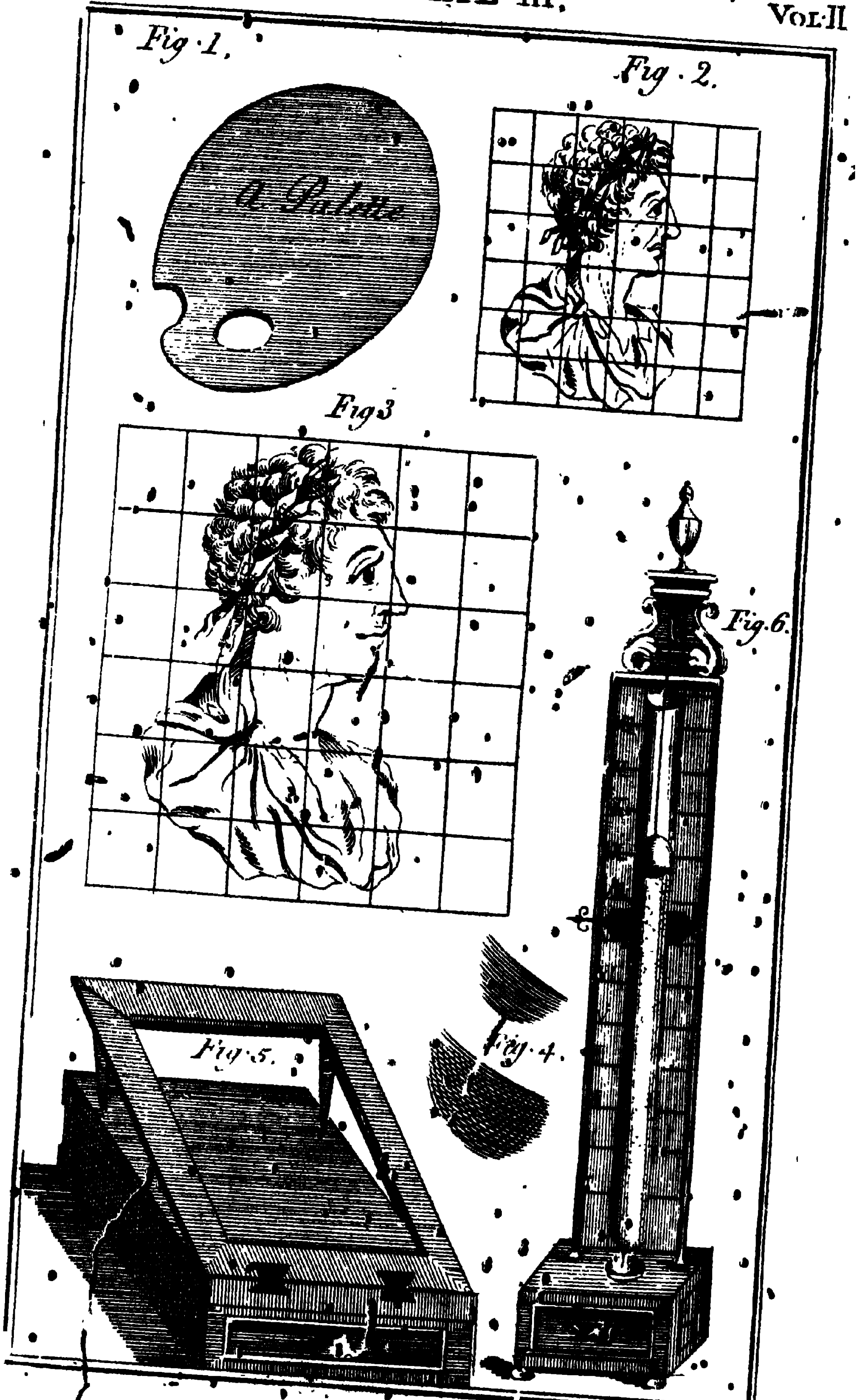

Fig·1.
A Palette
Fig · 2.
Fig 3
Fig·6.
Fig·5.
Fig·4.

PLATE IV.

Fig. 2.

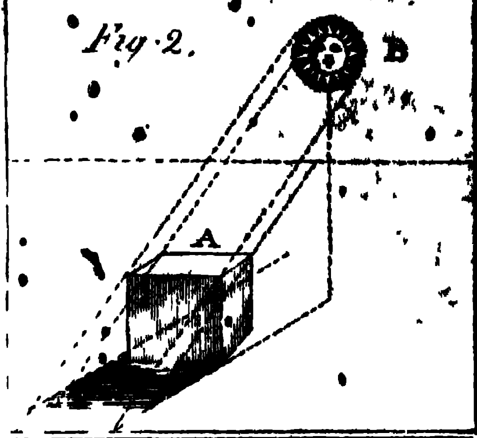


Fig. 1.

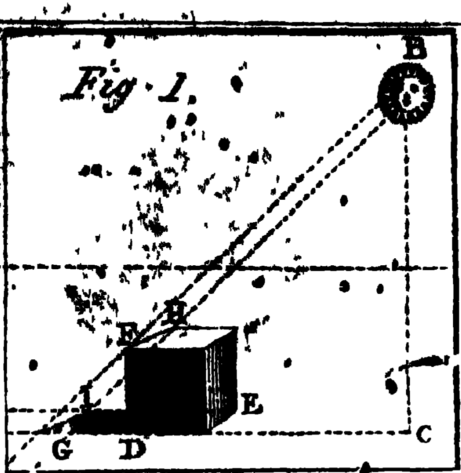


Fig. 4.

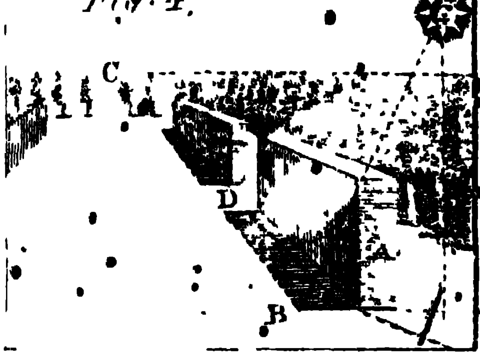


Fig. 3.

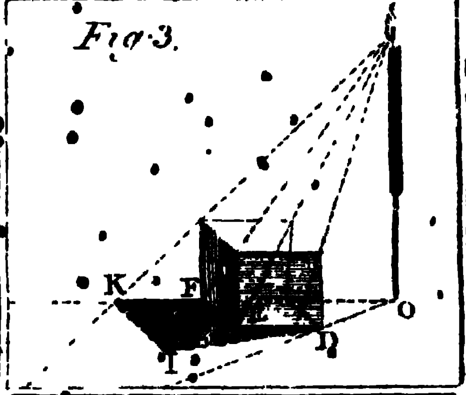


Fig. 6.

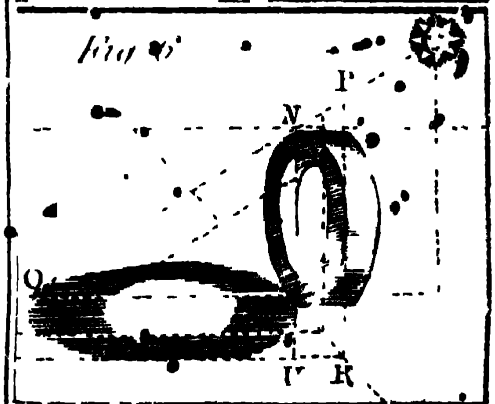
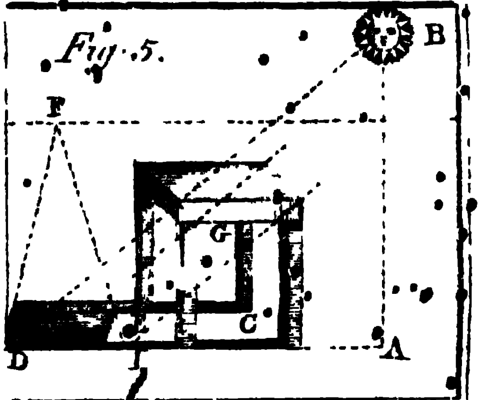


Fig. 5.



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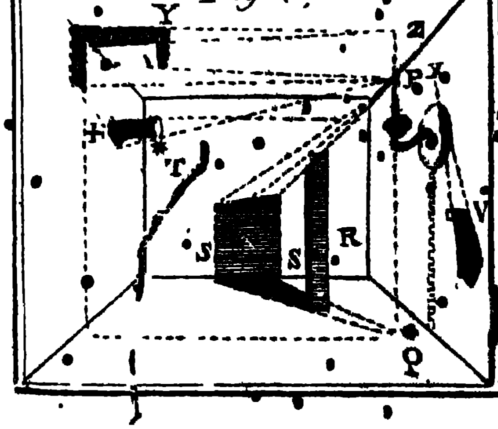

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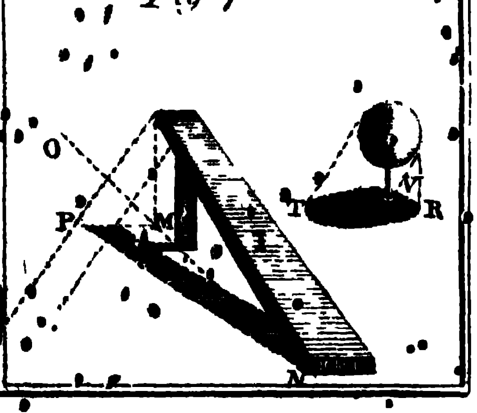
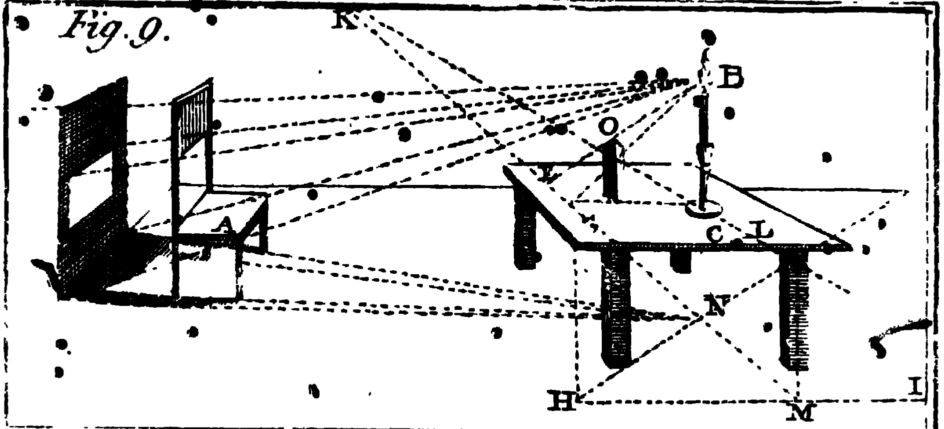


PLATE .V.

Vol.II.

Fig. 9.



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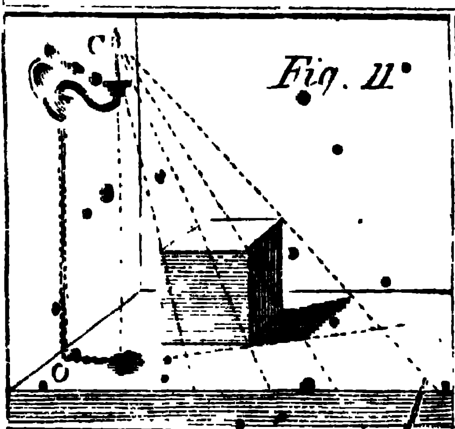

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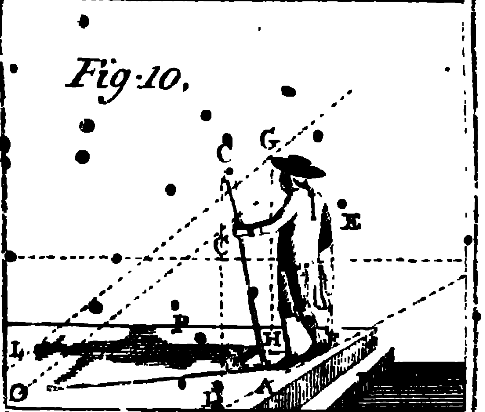

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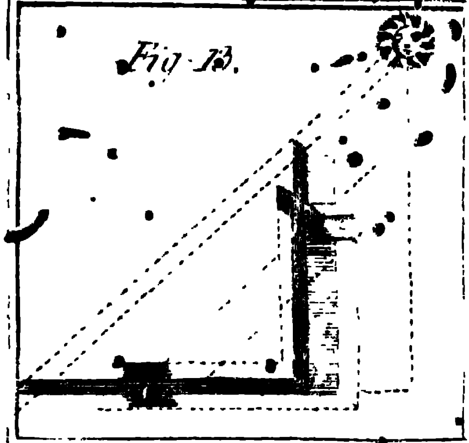

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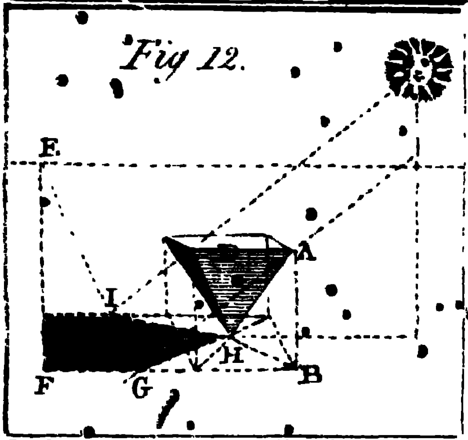

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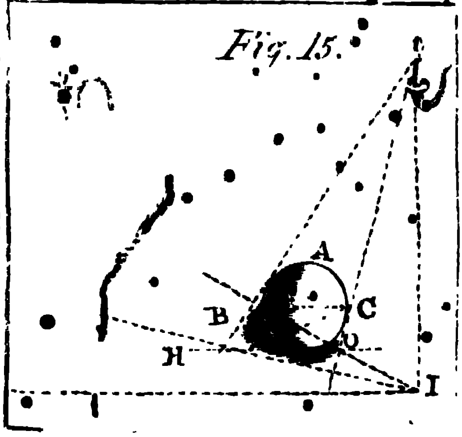

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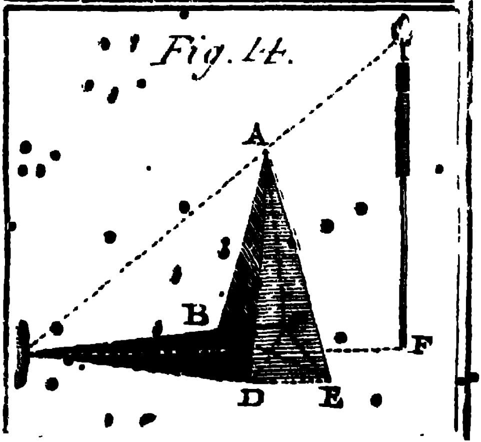

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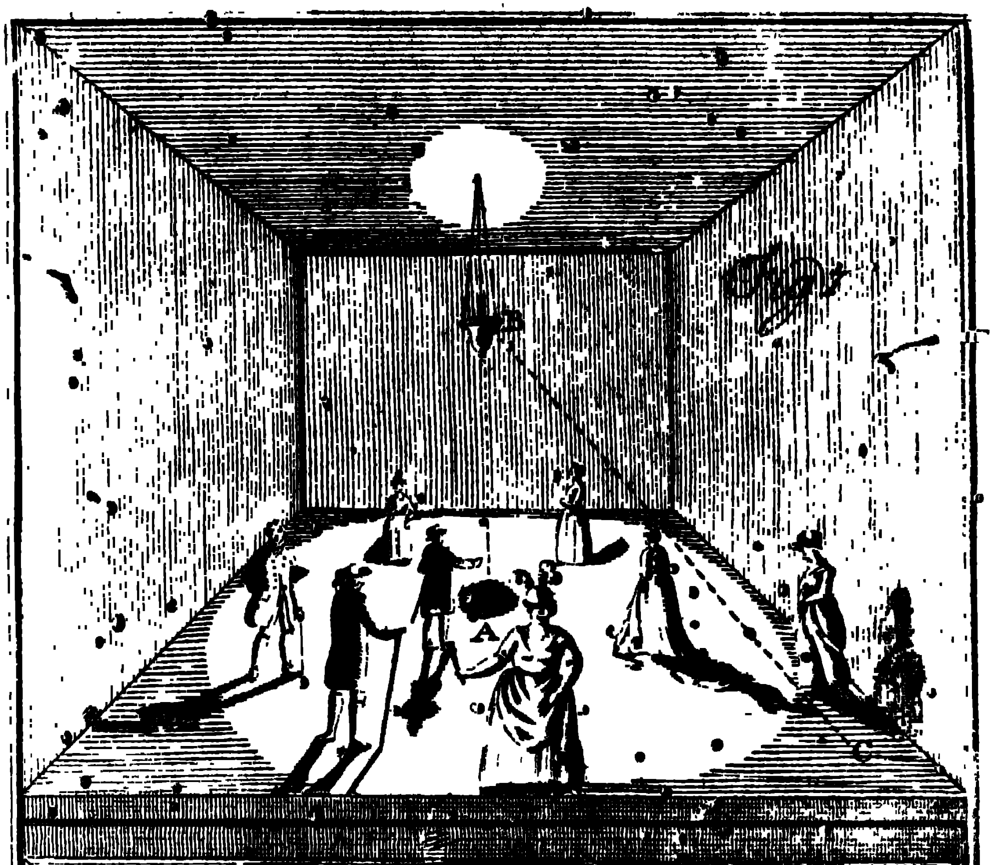

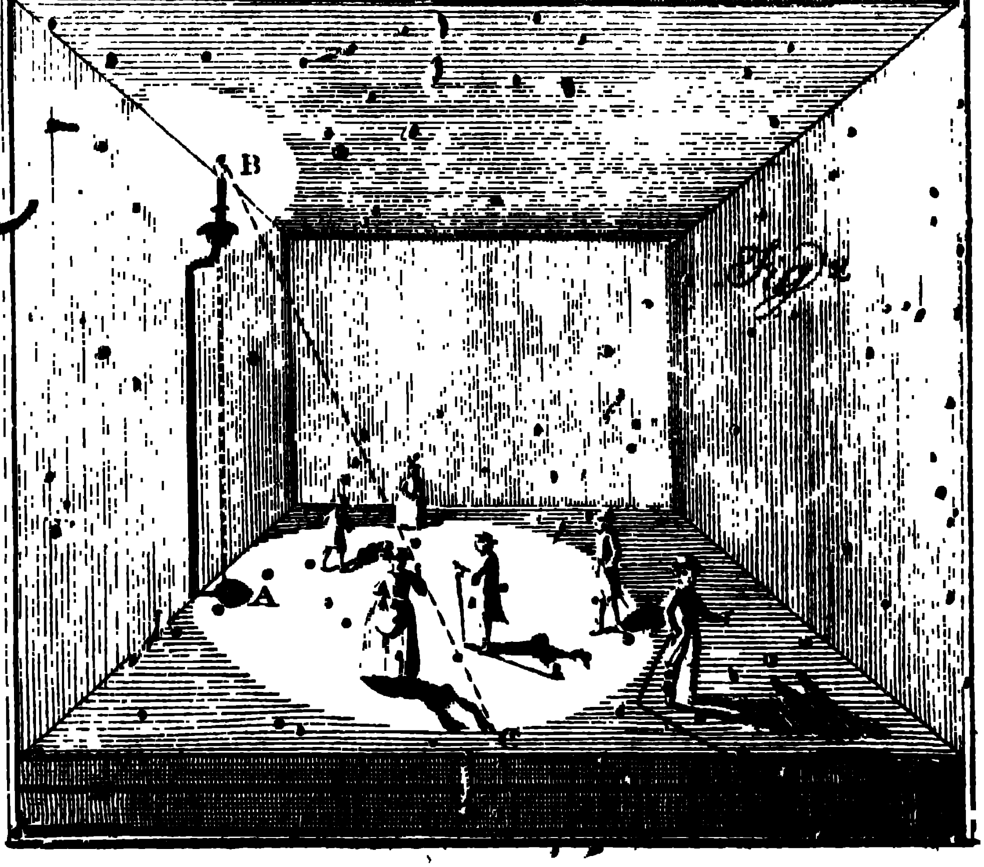

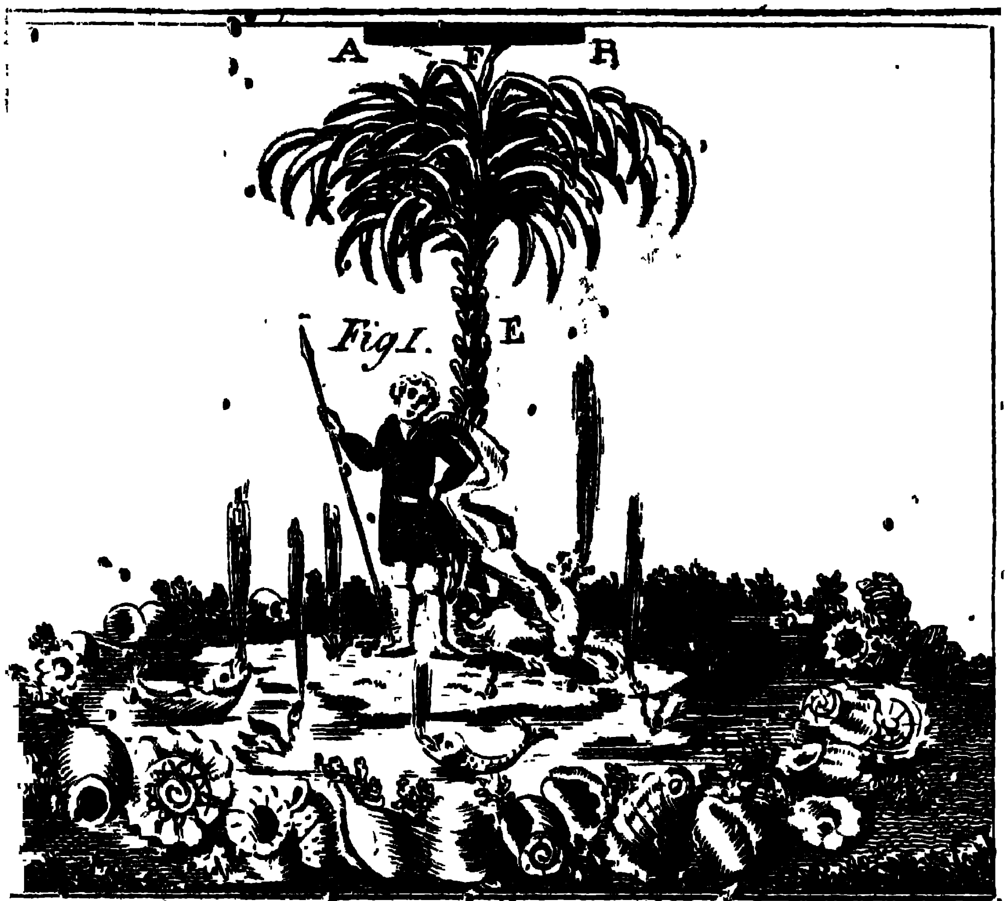
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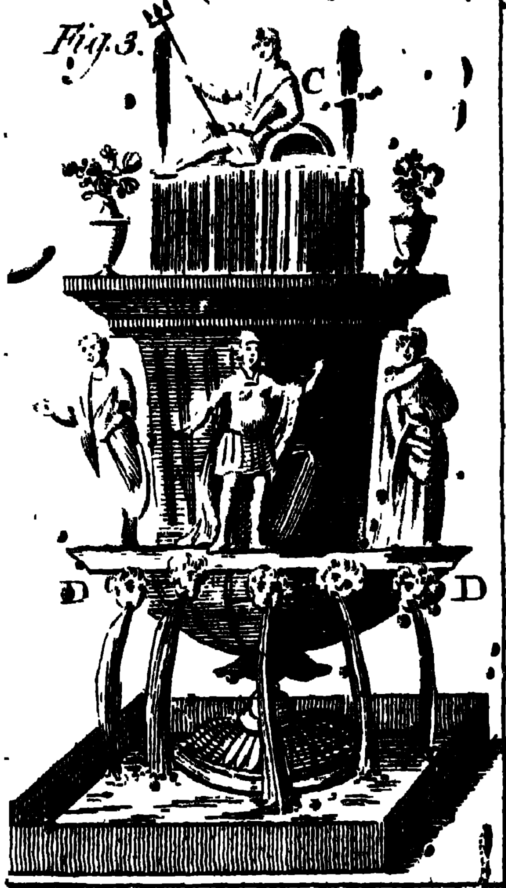
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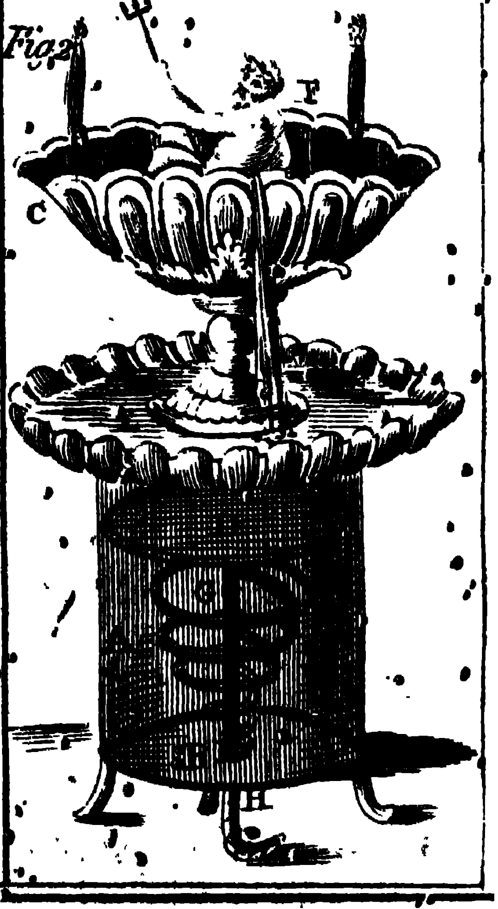
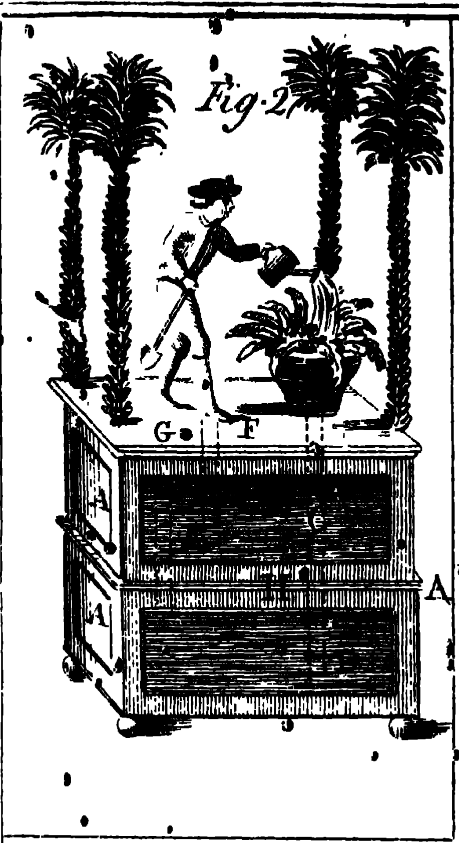


Fig. 2.

PLATE VIII. Vol. II.



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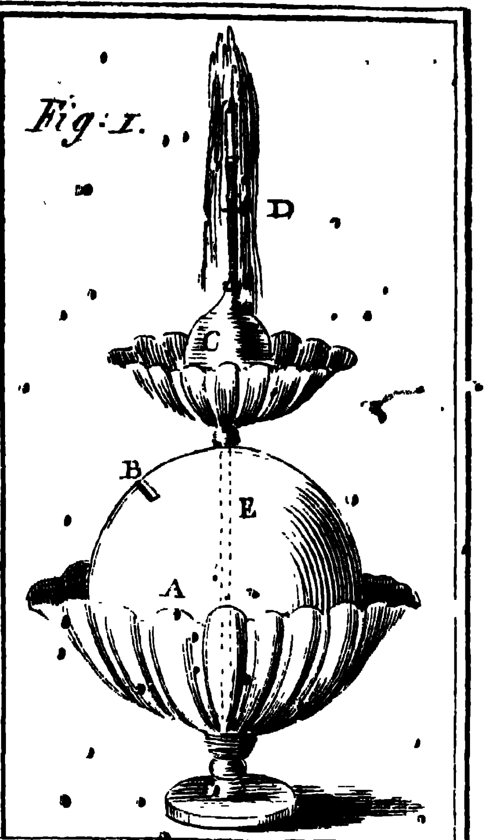

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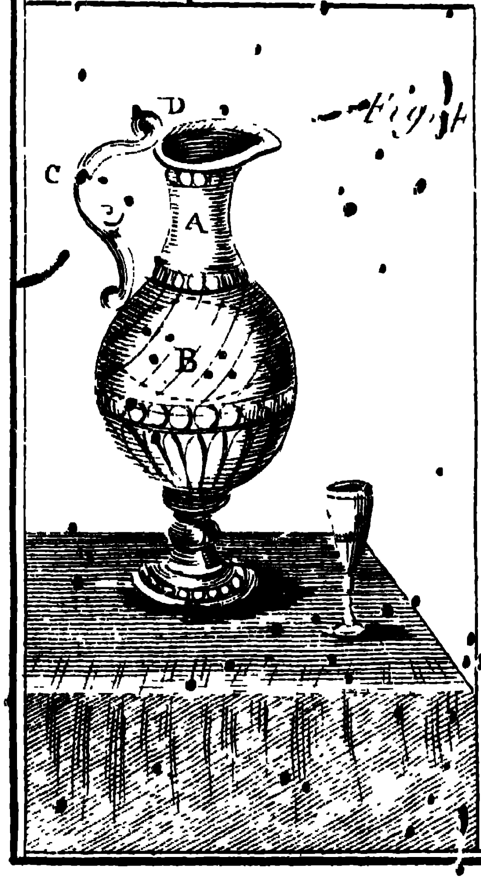

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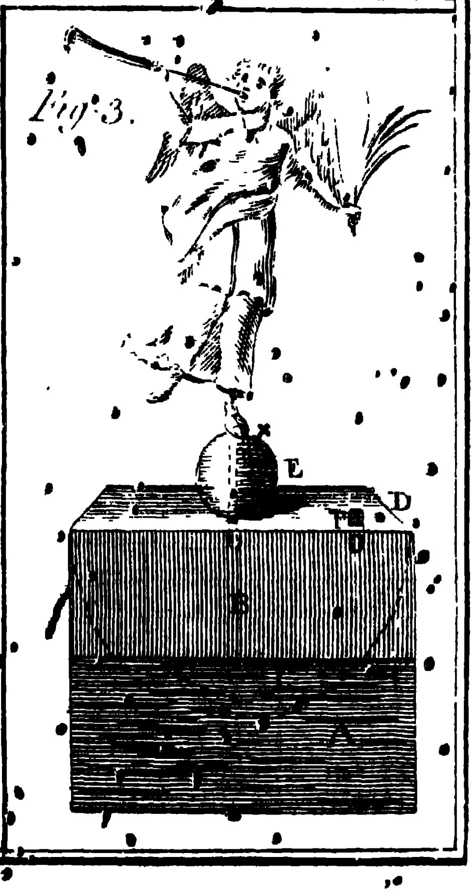
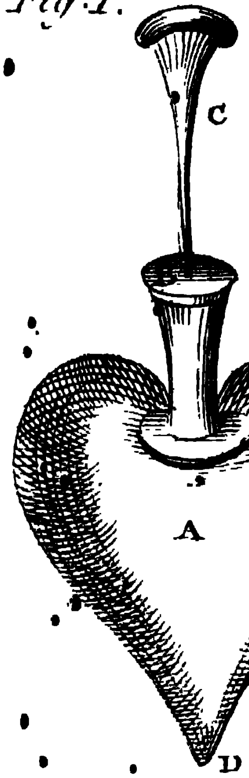


Fig. 3.

PLATE . IX . VOL. II

Fig. 1.



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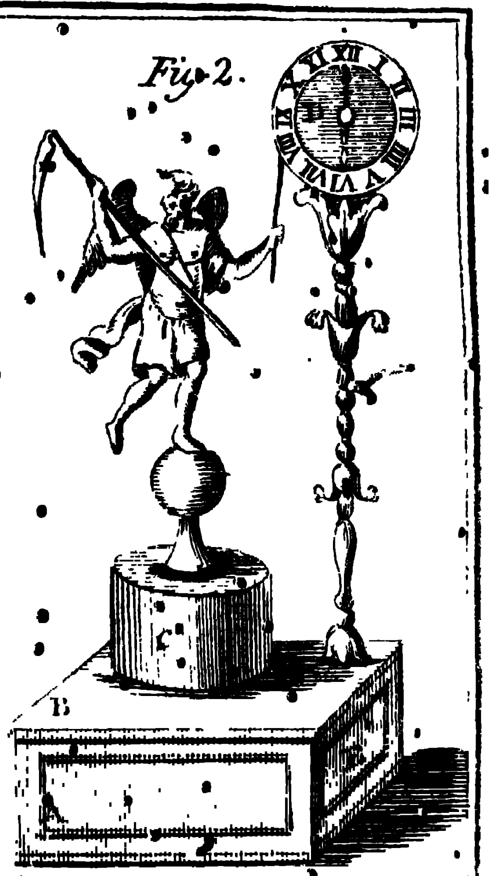

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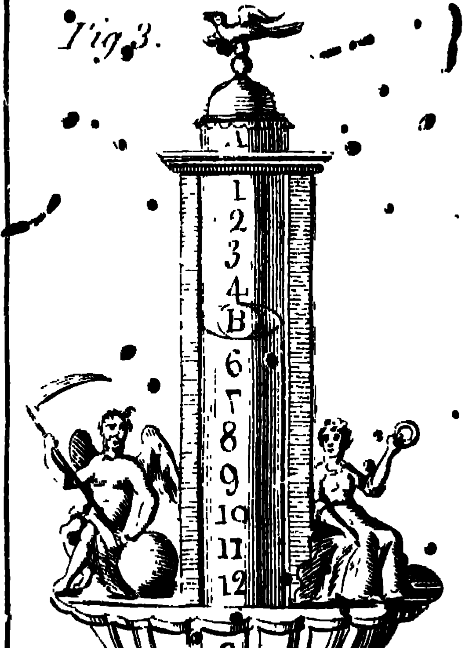

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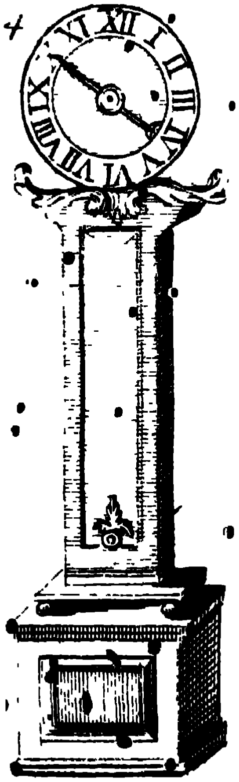
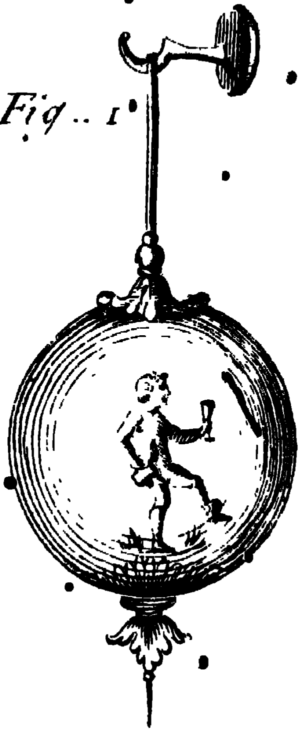


PLATE X. Vol. II.

Fig. 1



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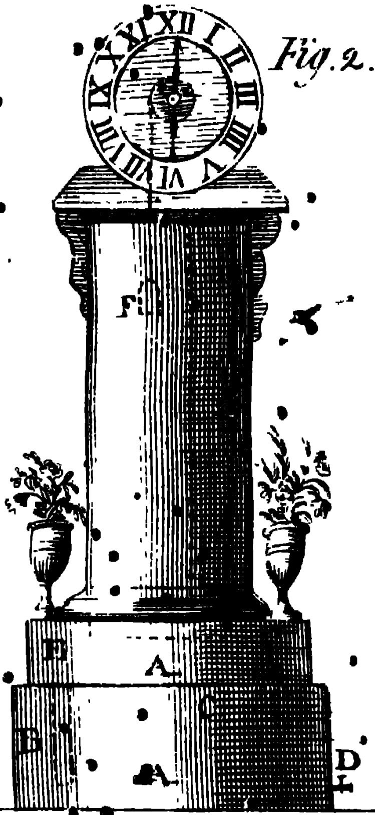

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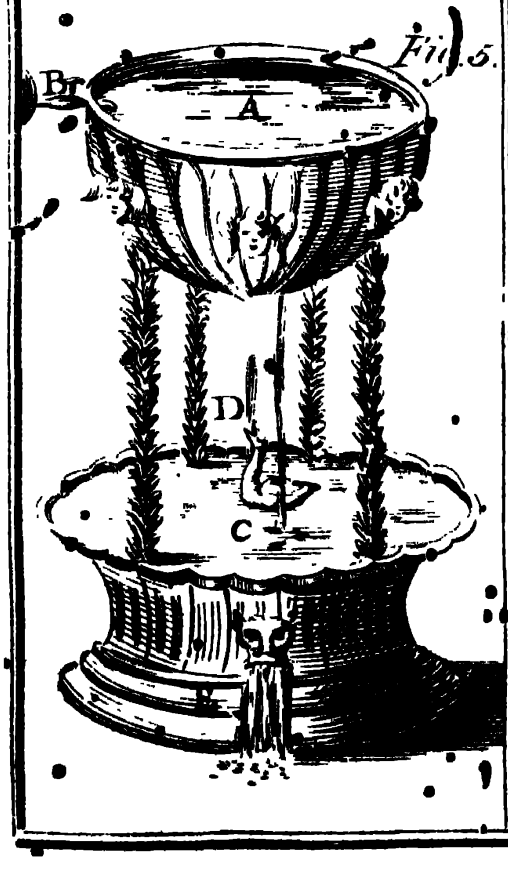

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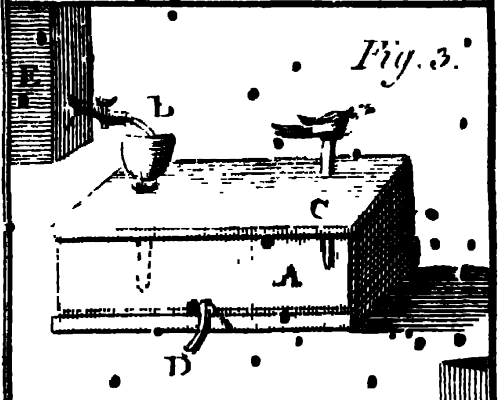

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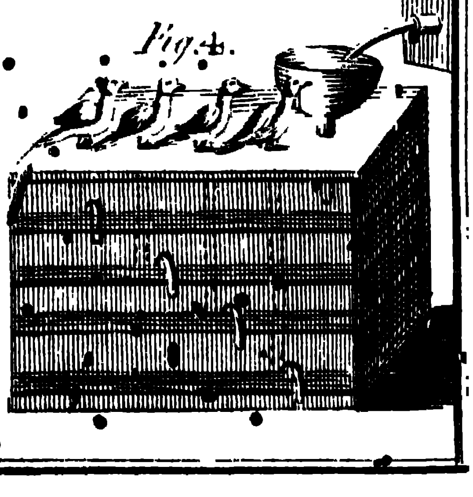
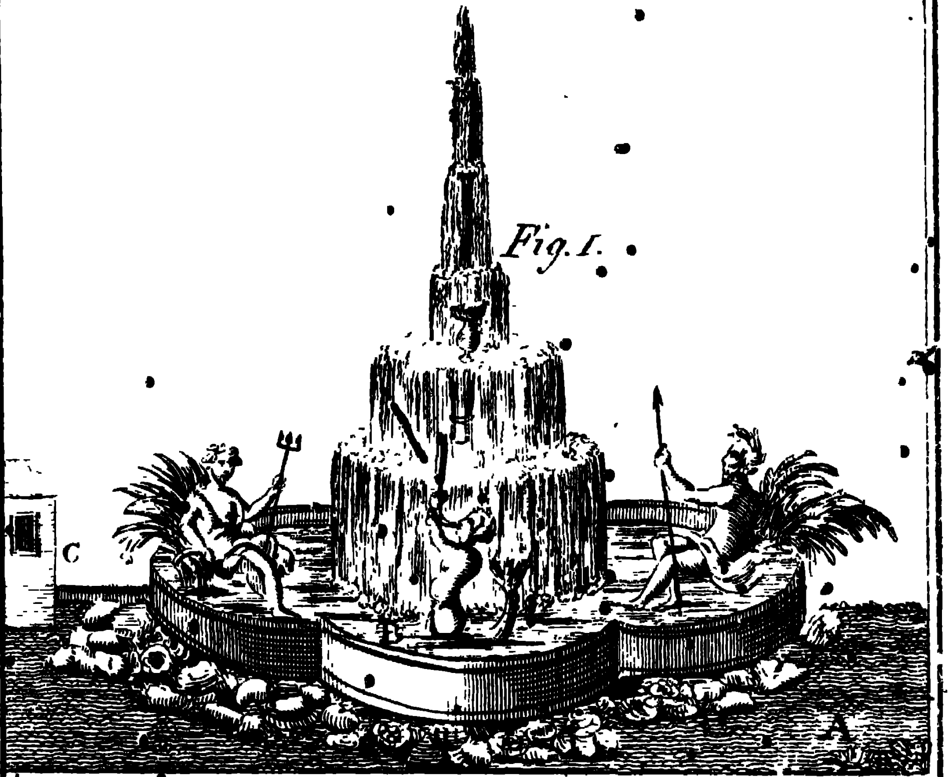


PLATE. XI.



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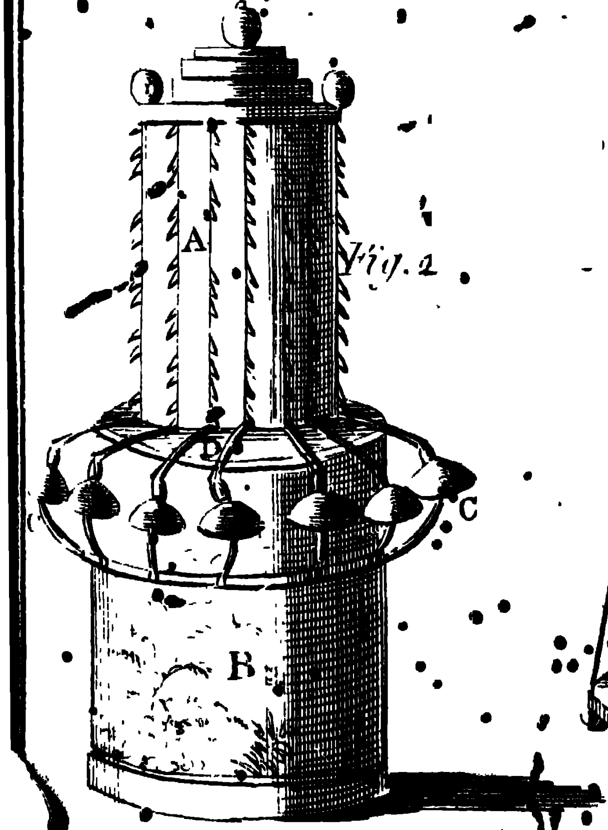

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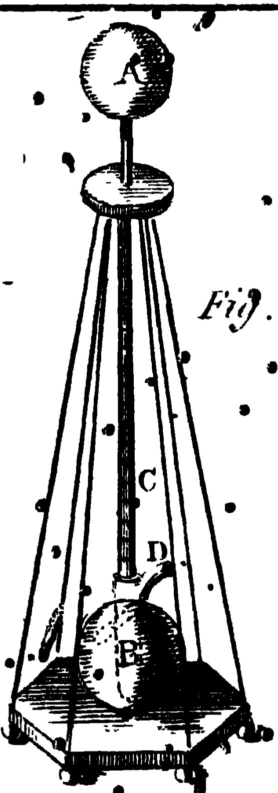


Fig. 3.

PLATE XII VOL II

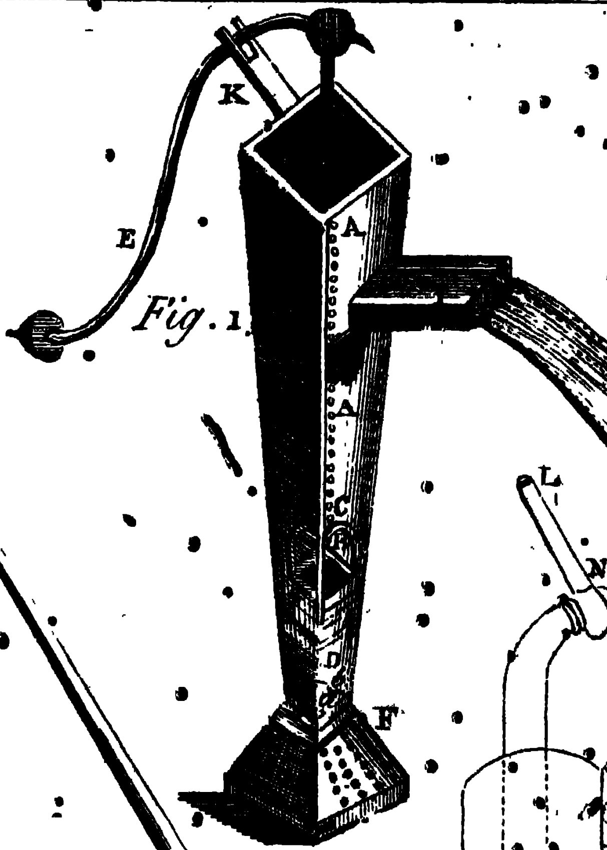
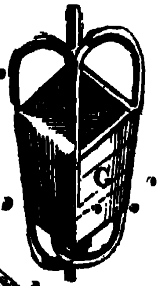
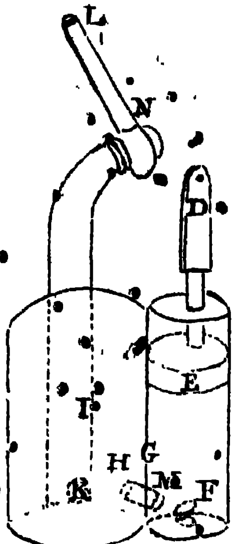


Fig. 1.

Fig. I.





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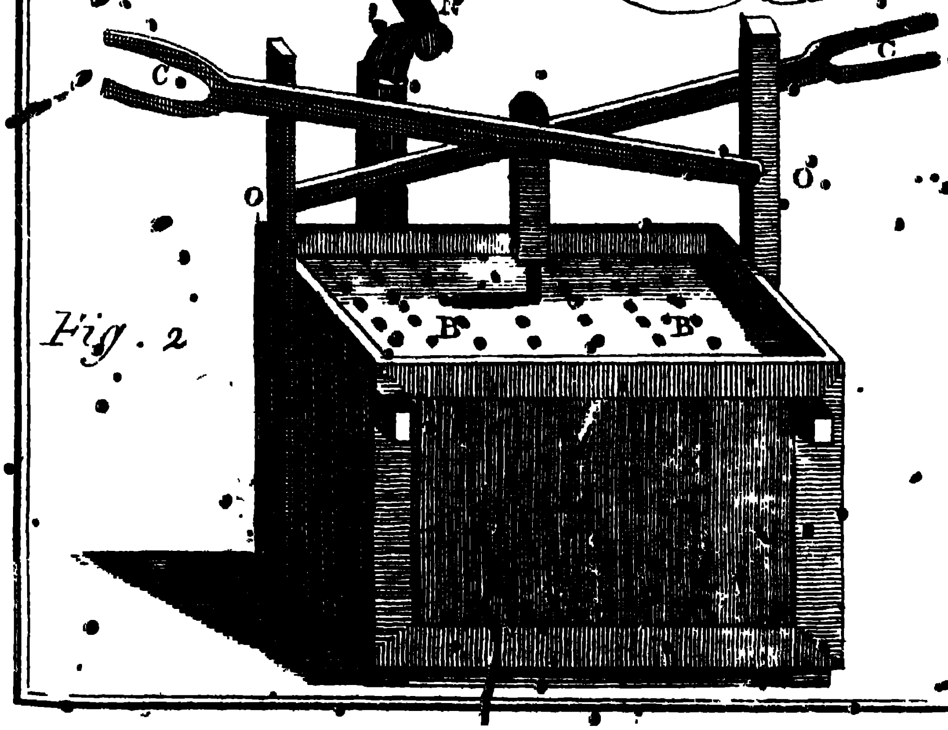

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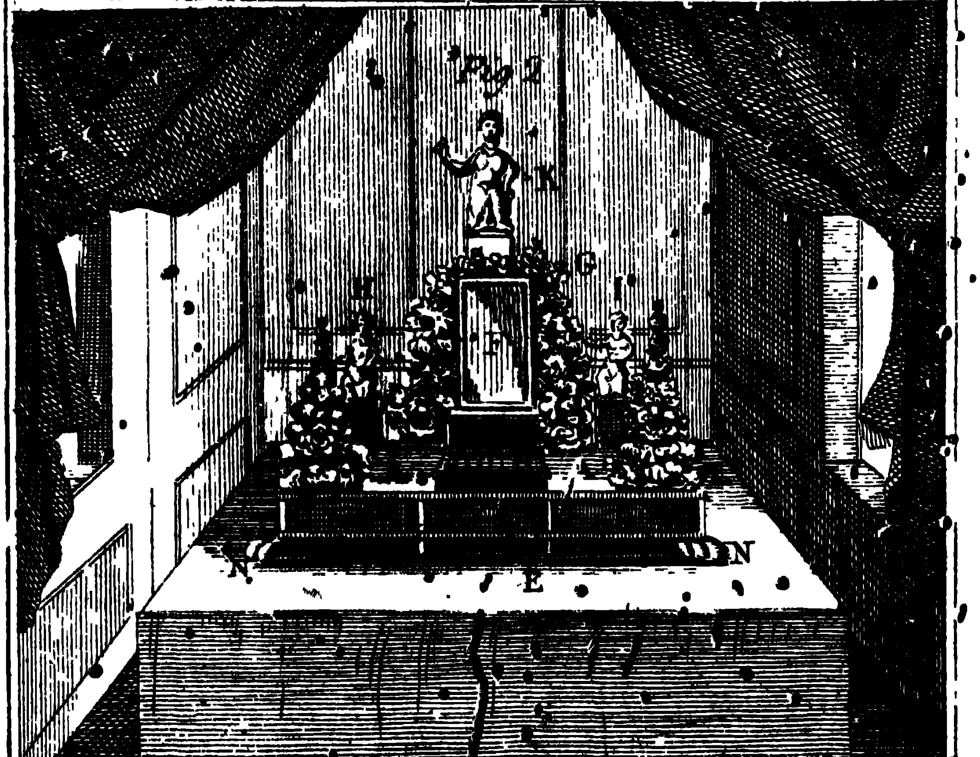
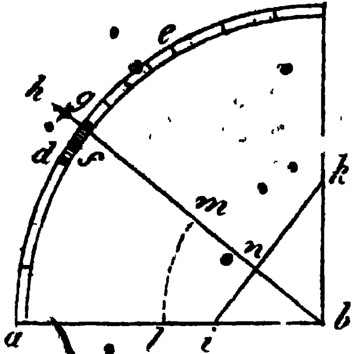


Fig 2
K
H
G
I
F
N
N
E

PLATE XIV.

Fig. 1. Fundamental Quadrant



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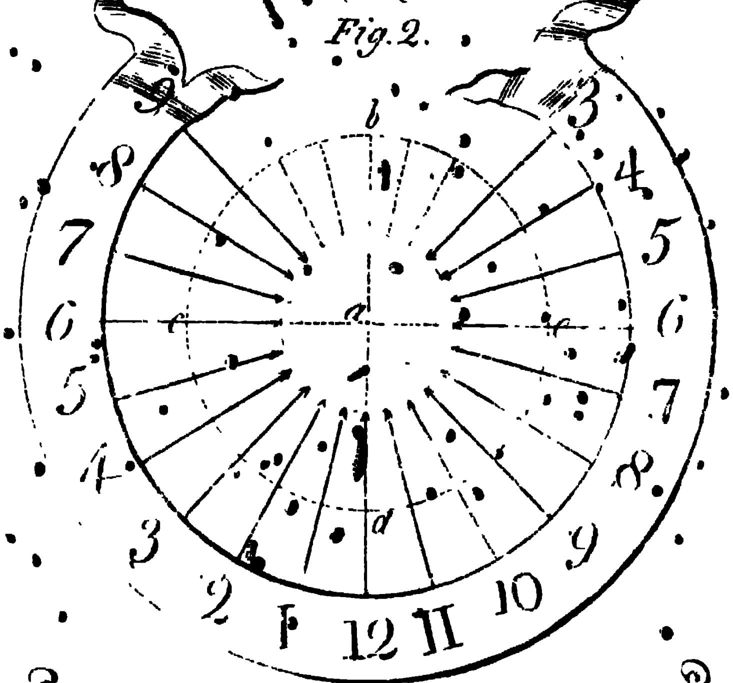

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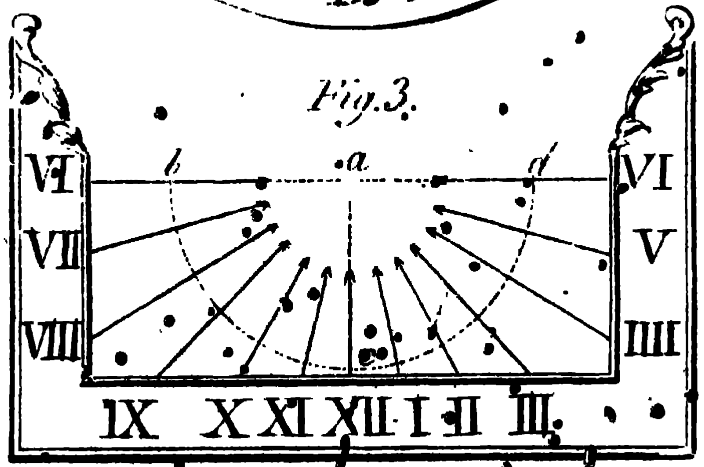
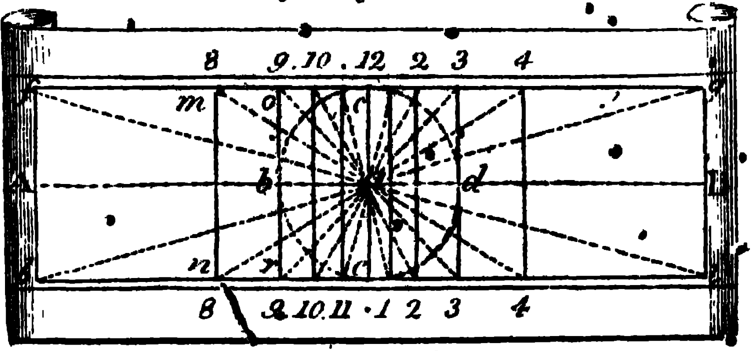


PLATE XVI

Vol. II

Fig. 4.



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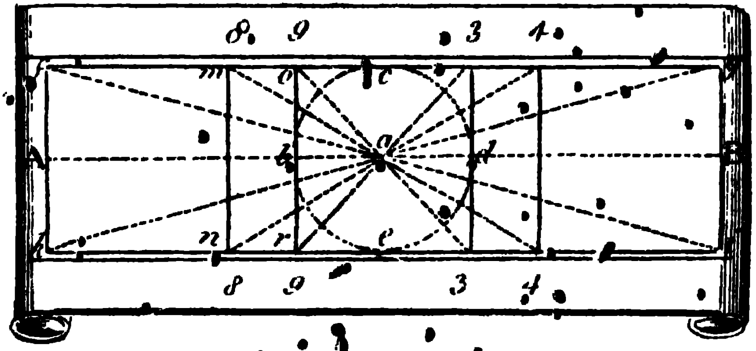

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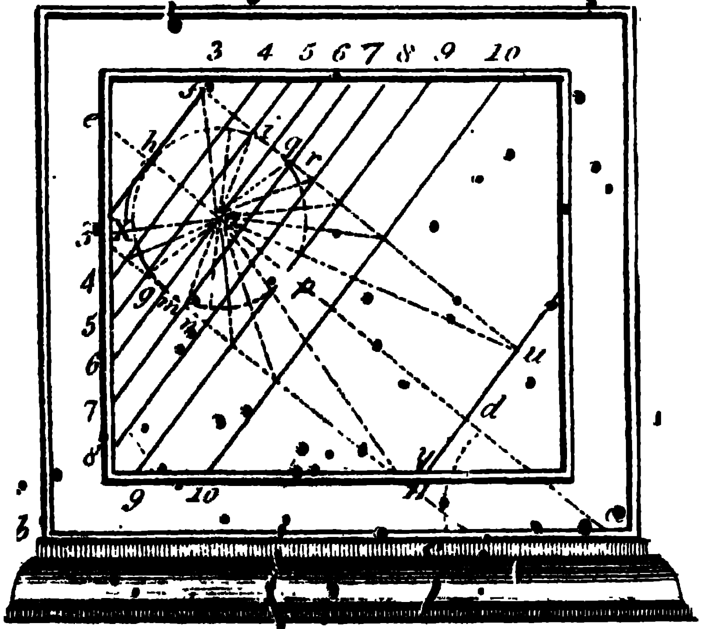


PLATE . XVI . Vol. II.

Fig. 7

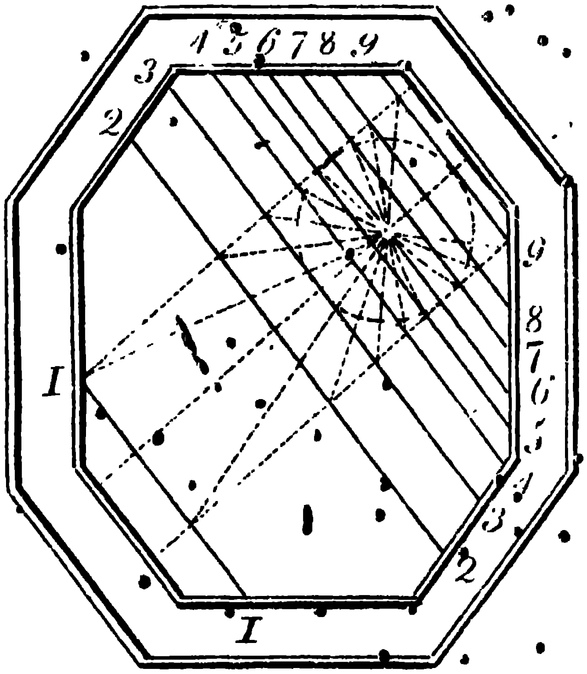


Fig. 8

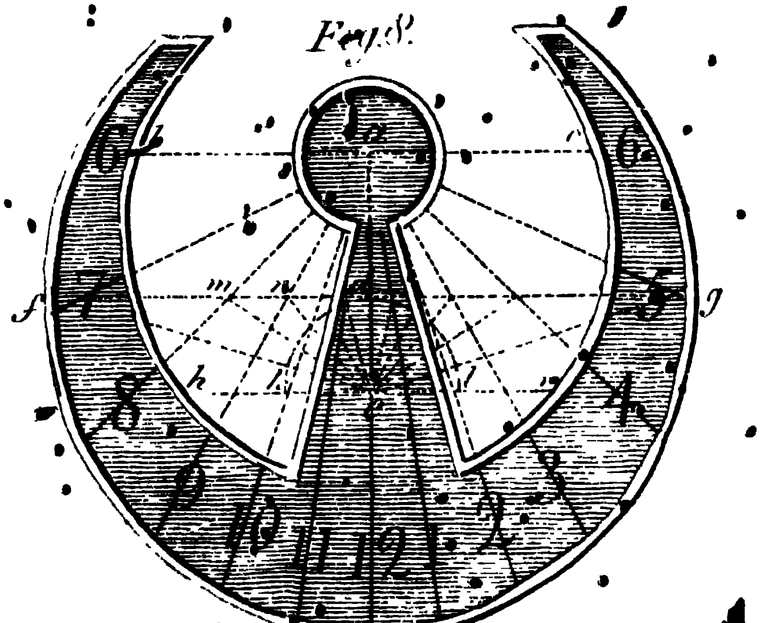


Fig. A

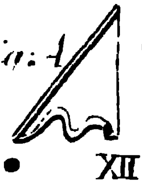
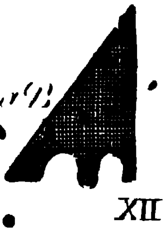


Fig. B



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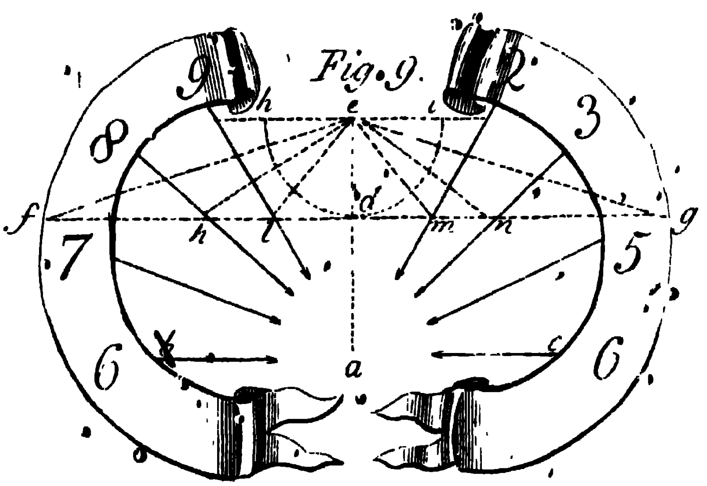

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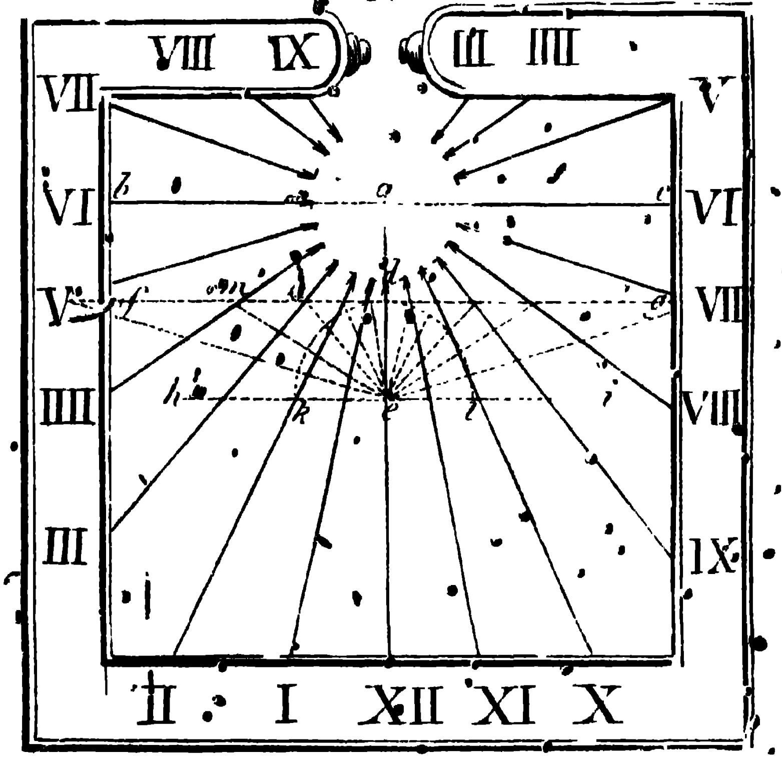

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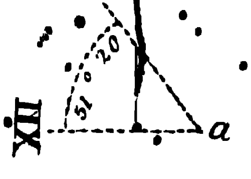

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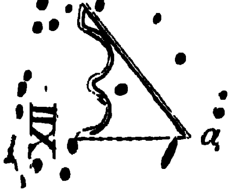

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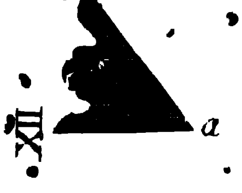
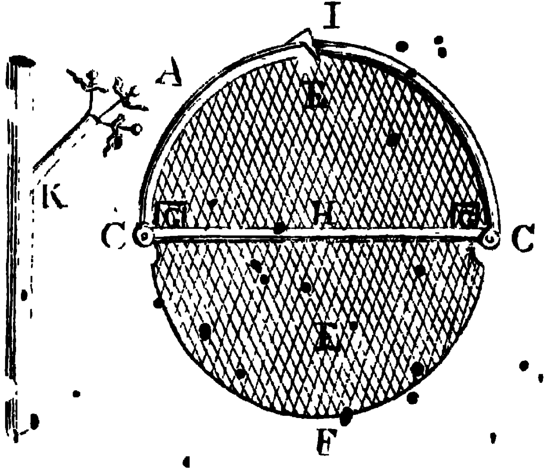


PLATE XXII

Fig. 1.



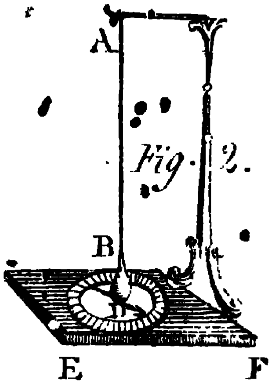
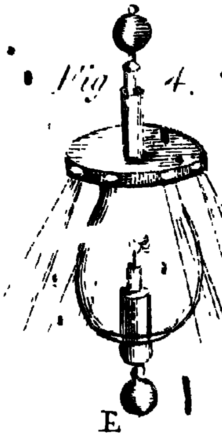


Fig. 2.

Fig. 3.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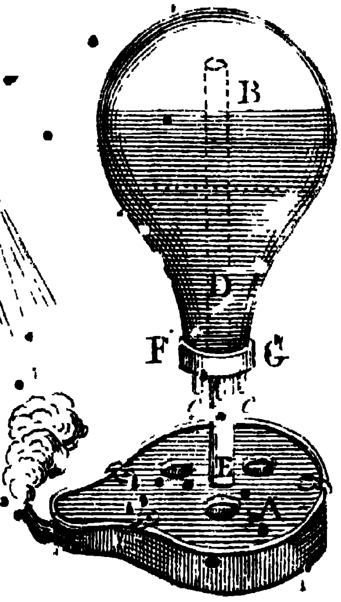

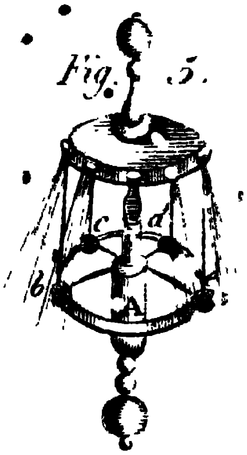
Fig. 5.